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ABSTRACT

Designed to make computer users comfortable with both computers and user/reference manual instructions before they have hands-on training, this primer is an introduction to computer concepts, devices, and terms. Common questions related to learning about data processing are addressed, and the following topics are covered: captured data; reports; documents (inputs, source, and turnaround); word processing and commercial establishment printing; word processing output and printers; standalone computing, communication with host, and timesharing; microcomputers, minicomputers, and distributed processing; and management information systems, canned programs, and systems analysis. A short quiz with answers is provided for each chapter. An 11-item bibliography and 38 diagrams are included. (LMM)

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COMPUTER TERMINALS AND TERMINOLOGY MADE EASY!

A PRIMER

DESIGNED AND WRITTEN BY

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for use by the

State of Wyoming
Department of Health and Social Services
Cheyenne, Wyoming 82002

January, 1984

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INTRODUCTION

When it became apparent that our Department was going to computerize in a big way, it also became apparent that some instruction and some familiarization was going to be necessary.

My own background and instruction in computers began about 15 years ago and computers became my career in about 1973. As Administrative Assistant in a Computer Data Center for a private industry, my first duties on computers included keeping personnel records and setting up a billing system and algorithm. Some of the early computers I used included a General Electric Telenet timesharing terminal, Four-Phase IV-70 system for both data and words, IBM 3277's and the IBM 360 host computer.

When I was promoted to supervising a data entry section, we used the Four-Phase equipment for data entry; we also experimented with it to do some word processing. About that same time, I trained with IBM's own employees on a product called ATMS (Advanced Text Management System) which was a fairly sophisticated word processor. Then my interests changed again when I began supervising a data base management group. We used the IBM 3277's and SPF (Special Program Functions) and TSO (Time Sharing Option) to create a huge data base which maintained the programming languages and all acceptable words for the industry, all sales codes, all product codes, electronic mail, and some other duties. In the meantime, I had gone to night school and obtained an A.A.S. degree in Data Processing. That introduced me to several programming languages, systems analysis and actual computer operation.

In two other positions I wrote user manuals and documented systems for some companies whose documentation had been destroyed. It's awkward and a little bit backward to draw flowcharts and write instructions for the program by reading the program as it already exists; but it can be done.

Since then I have worked with the State of Wyoming Department of Health and Social Services as a Management Information Systems Data Coordinator. In that capacity I analyze old or manual systems, then advise whether or not they should be changed or computerized. I act as liaison with Data Services (the centralized state agency for data processing). I get involved in reporting requirements, the proper report retrieval language to be used, and maintenance performed on existing systems. For new systems I help design systems, individual files, output reports, and even suggest the type of equipment to be used. When word processors were allowed by Data Services in 1982, additional decisions had to be made regarding configurations. Now that they microcomputers are allowed, we are attempting to get ready for them with this introductory manual or 'primer'. Then when the actual training for the individual terminals is offered, you should be comfortable with the concepts and terminology. While completing my B.S. in Business Administration, some of the classes involved training; hopefully those skills will make this 'primer' and the followup training both useful and enjoyable for all of us.

The followup training will be conducted after completion of this primer, and will include hands-on training with the computer terminals and some actual applications. Hopefully, training will be done in regional workshops or a series of workshops conducted at a central site. Since the computer keyboard is a glorified typewriter, the skills needed will be basic typing and an open mind.

Good luck!

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COMPUTER TERMINALS AND TERMINOLOGY MADE EASY!

OUTLINE

In order to begin explaining terminals and terminology, I asked myself what would be the most common questions for a person trying to learn about data processing. The following questions will be addressed and answered throughout this primer.

What is data? Why do we want to capture it? What will be done with it?

What is a report? What types of reports are there? How do I choose? How do I know I chose the right report? Who else should get the output? Turnaround documents. Input documents.

Source vs. turnaround. When should stuff go to the printing establishment instead of using the computer's printer?

What is a computer? What is a program? What can be computerized? What cannot?

When I turn off the computer, do I lose everything? What is 'storing' data? What is 'closing' files?

When do I need standalone and when do I need the host? When can I dial-up and when should I use online? Do I need phone lines, satellites or microwaves? Do I need canned software, tailored or developed for my single purpose?

Can I read the manual or do I need special data processing courses? Do I need high school or college level training? Can I get it by self-teaching aids or do I need more? Do I need to rely on others or make decisions myself? Do I want to be a decisionmaker, analyst, programmer, entry person, or recipient of the final results?

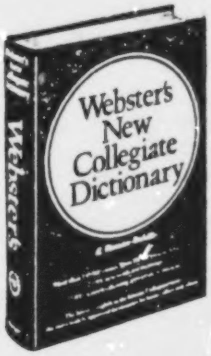
Do I want narrative, columns of data/numbers, a matrix, ratio, percentage, graph, or what? Do I need a word or data processor? What can I afford? Can I start small and build? Can I expand once I make my choice? What are the limitations? The positive aspects? Do I need a personal or business computer? Do I need floppy disk, hard disk, tape, disk drives or combinations? Do I need typing skills or adding machine skills?

Do I need a printer? Dot matrix, high speed, or letter quality? How fast should it print? Do I need it dedicated or can I route output to it? Do I need to communicate with other terminals? Other printers? Do I need a surge adapter? Do I need an uninterruptible power source? Do I need to move my terminal from one location to another? Can it be shared? How far can the terminal be from the control unit?

If shared, what security precautions do I need to take? How much "prompting"? Words or numbers? When I first plug it in, what do I do with it? Will it tell me to do something, or just sit there? Does it automatically spit out what I want? Will everyone be able to run it right away?

Do I need to refer to the glossary or can I remember terms without garbling them? What are the latest buzz-words and acronyms? Am I comfortable with them? Do I know enough to make an intelligent request?

Throughout this document words have been defined in data processing terms. To relate those words to everyday meanings, definitions have often included those found in Webster's New Collegiate Dictionary (usually only one meaning; not the entire citation).



INSTRUCTIONS

As you go through this primer, please read each section carefully. Then at the end of each section, you will find a page of questions and answers. Even though the answers are given in the left-hand column, please don't use them. Instead, answer each question with the answers covered; then compare your answers to those in the left-hand column.

Go back to the section and re-read the portions regarding the subject to which you may have supplied a wrong answer.

When you have completed each section and satisfactorily answered all the questions at the end, you should be comfortable with the concept of terminals, and the terminology associated with terminals and data processing in general.

Computers are only as useful as the information which is put in them. They can be a great help to us, or a bother if we use them sloppily. But, one thing we need to keep in mind is that computers exist for the purpose of making our work easier. Any time we can enter data just once into any device and use it over and over again for a variety of purposes, we should be saving time and energy. With computers, we should be able to achieve the effectiveness and efficiency for which most of us strive throughout our lives.

Data processing jargon or specialized words are used throughout this primer, and usually they are defined when they are used (both in Webster's terms and data processing terms). However, to make it easier to find them later, a complete glossary is contained in the appendix. I hope this is useful and easy to use.

Please remember that this primer is not designed to guide you step by step through the operation of a terminal when you sit down at one for the first time. Instead, it is an introduction to the computer concepts, devices and terms to be encountered; hopefully this primer will make you comfortable with the computers themselves and the instructions you will find in user manuals and reference manuals.

Good luck!

COMPUTER TERMINALS

AND

TERMINOLOGY

MADE EASY !

I. WHAT IS DATA?

Data is factual information used as a basis for reasoning, discussion, or calculation. In data processing terms, data is a representation (such as characters) to which meaning might be assigned; for example a representation of information expressed in the form of conventional signs and symbols.

Do we all use data in our everyday work? Chances are that, yes, we do.
My name, address, and Social Security Number is data;
"1 + 1 = 2" is data.
To add, subtract, multiply and divide, symbols '+ - * /' are used:
2 * 2 = 4 and 4 / 2 = 2 are expressions of data.

Any form which is filled in, any letter received or sent, any report prepared or read, even information which is verbally transmitted to another person can be data. Form is defined as a prescribed and set order of words. For example, a set of index cards become 'forms' when each one has the information set out in the same way:

NAME: ....
ADDRESS: ....
....
HOME PHONE: (   )...-....   OFFICE PHONE: (   )...-....
WORK ADDRESS:...........................(Name of Company)
...................................(Street Address)
...................................(City, State, Zip)

So, for data processing purposes, a form is defined as a document that has blank spaces for the insertion of data such as a blank bank check, an application form such as the 460 for AFDC and the 960 for Food Stamps, etc.

WHY WOULD I WANT TO CAPTURE DATA?

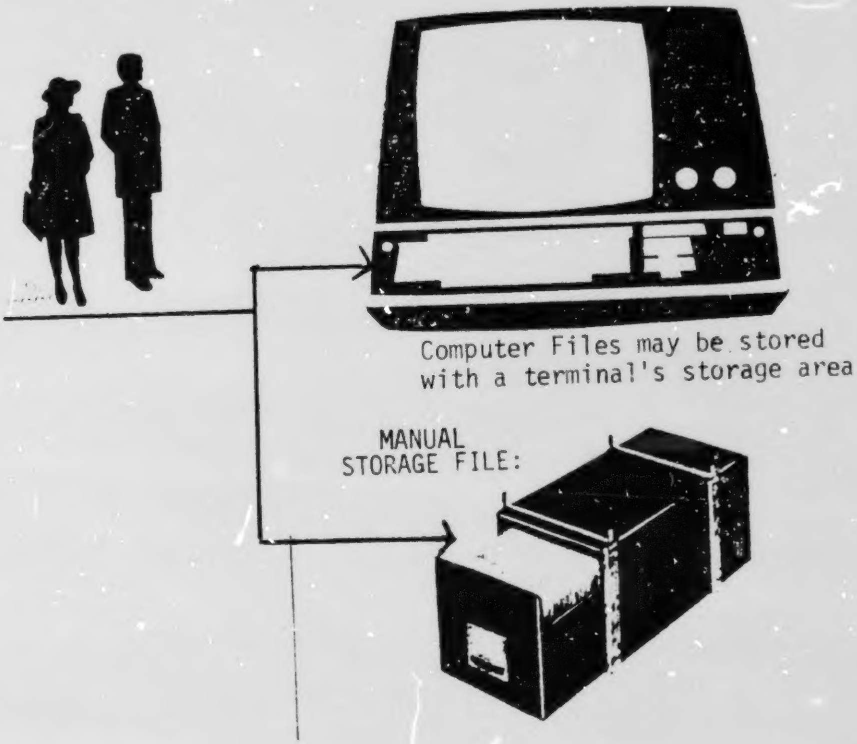
If data is important enough to be wanted at a later date (by us, by our peers, by subordinates, or by our supervisors) it should be captured. The greater the number of people involved in either supplying or receiving data, the more important it is to have the data capture standardized (probably by using a form). Another reason for capturing data is so that it can be compared to either data from the past or data we hope to capture in the future. From such comparisons, decisions can be made, trends can be monitored, and/or mistakes can be avoided. Those with fiscal responsibility can check accuracy, balance accounts, monitor budgets and expenditures, and follow accepted accounting procedures by using data in prescribed formats.

WHAT WILL BE DONE WITH THE DATA THAT IS CAPTURED?

The data can remain on the form on which it was gathered (either handwritten or typed), and would then be considered the source document; it can be coded onto another form called an input form; it can be filed; it can be distributed to others; it can be input into a computer; it can be used to prepare reports (either in its present form, or after it has been computerized and manipulated); it can be analyzed as to its usefulness and then either retained or discarded.

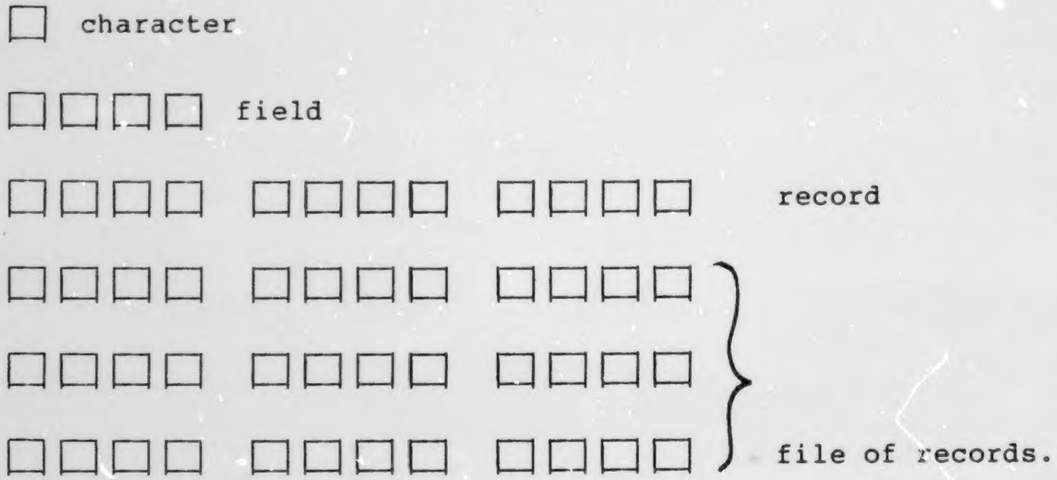
If it is coded onto another form, that means that a system of signals for communication - to put in or into the form or symbols of a code - has been devised. Code is the set of rules used to convert data from one form of representation to another. Webster's defines input as information fed into a data processing system or computer. An input form is the form which contains data that is to be processed or operated upon.

Manual input refers to the entry of data, the data itself, the channel or device used to enter data into a machine through the direct manipulation of a device by a human being. Manual filing means to store data in some predetermined sequence or method for later retrieval. A computer file is a collection of related records with a common identifier or key joining or relating them.


Computer Files may be stored
with a terminal's storage area
MANUAL
STORAGE FILE:

Data can be distributed through traditional methods of handing to a person, sending through interoffice or postal service mail, or electronically from one location to another over a phone line or a dedicated line which connects one computer and/or terminal to another. The raw data (just as it was gathered) can be collected in such a way that all the fields that are alike can be counted or compared by the computer; these fields can be used then to perform calculations (add/subtract/multiply/divide) on other fields. Then the data has been manipulated, and analysis can be performed as to usefulness.

Standardization of the input document and fields contained on it are very important. The main reason for storing data is retrieval at some later date. In order to retrieve data effectively and efficiently there must be some common method or system for both storing and retrieving. The 'key' may be a number such as Social Security Number or an alphabetical key such as last names. The two keys can be cross-referenced as long as both fields exist for each record.



ANSWERS MULTIPLE CHOICE QUESTIONS

A. Data is __________ used as a basis for reasoning, discussion or calculation.

A. factual information
B. theory
C. tools
D. all of the above
E. none of the above

D. Data is a representation to which meaning can be assigned. Which of the following 'representations' can be used for data?

A. characters
B. signs
C. symbols
D. all of the above
E. none of the above

E. Data should be captured if it is important enough to be wanted at a later date; but only if wanted by:
A. myself
B. my boss
C. my subordinate
D. my peers
E. all of the above

D. Captured data can be compared to either data from the past or data we hope to capture in the future. Then it could be used to:

A. avoid decisionmaking
B. make mistakes
C. keep from fiscal people
D. monitor trends
E. none of the above

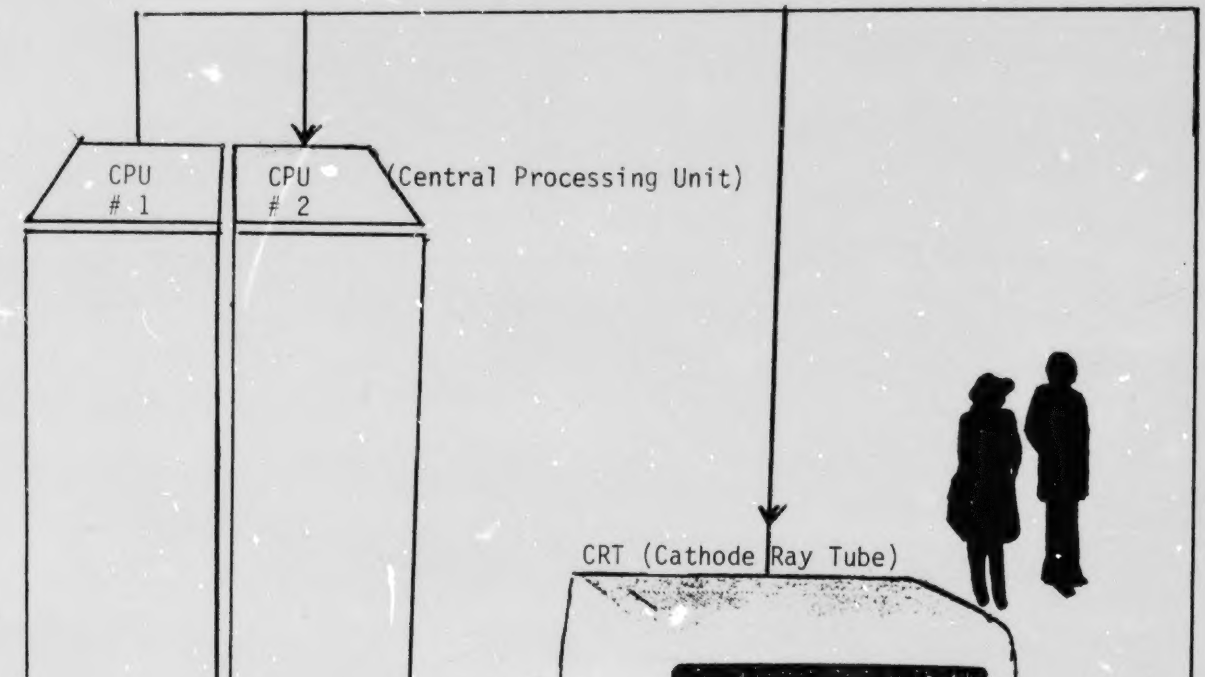
B. Fiscal users of data can, by using data in prescribed formats:

A. keep accounts from balancing
B. follow accepted accounting procedures
C. avoid accuracy
D. ignore budgets and expenditures
E. none of the above

E. Once captured, data can:
A. remain on the form on which it was gathered
B. be coded onto another form
C. be filed
D. be used to prepare reports
E. all of the above

II. WHAT IS A REPORT?

Webster defines a report as 'to make a written record or summary' as well as all other uses of the word 'report'. In data processing, a report is just one of many forms of 'OUTPUT', which is data that has been processed. Output may also mean the process of transferring data from a computer's internal storage (called the CPU or Central Processing Unit) to its external storage, or even to other equipment or a human being.


CPU # 1
CPU # 2
(Central Processing Unit)
CRT (Cathode Ray Tube)
Report
Printer

WHAT TYPES OF REPORTS ARE THERE?

Reports can be narratives, columns of figures, counts or tallies of occurrences, comparisons of one item of data to another, financial, statistical, management information or even forecasts.

Narrative reports would probably come under the category of management information. Such reports would most likely be prepared on a word processor as opposed to a data processor (even though both types of processors are technically computers).

Narratives are made up of text (letters) instead of symbols or numbers; thus you would expect to see standard structures such as sentences, paragraphs, pages, and a final document. The narrative format is often used to summarize events which have already happened, or to plan/forecast how events should happen over a given time period, and to monitor how closely actual events are following the outlined plan/projection. Often narrative reports are given as backup to financial or statistical reports since the picture is worth a thousand words (but sometimes it takes nearly the whole thousand to explain the picture).

Columns of figures can be found in both statistical and financial reports (as well as accompanying the narrative for management information reports). Some of the more familiar financial reports are budgets, sub-budgets, cost allocations and accounts payable/receivable as well as payroll. Some of the familiar statistical reports would include the DPASS semi-annual statistics; Child Abuse/Neglect category totals by county; Vital Records figures given to the National Center for Health Statistics (NCHS) regarding birth, death, marriage, divorce.

Once NCHS gets the 'raw data' or figures from Vital Records, they run programs on their computer which compares Wyoming's totals to other states and shows ratios, comparisons, percentages; and categorizes them further by age, sex, national origin, etc. After the data is thus manipulated, it is published in yet another 'report' which has become much more detailed than the original data that was input.

The way data is collected presently, there is practically no limit to its uses. The computer just needs it to be collected once, then it can be used and re-used in many different applications and it can be shown in many different ways.

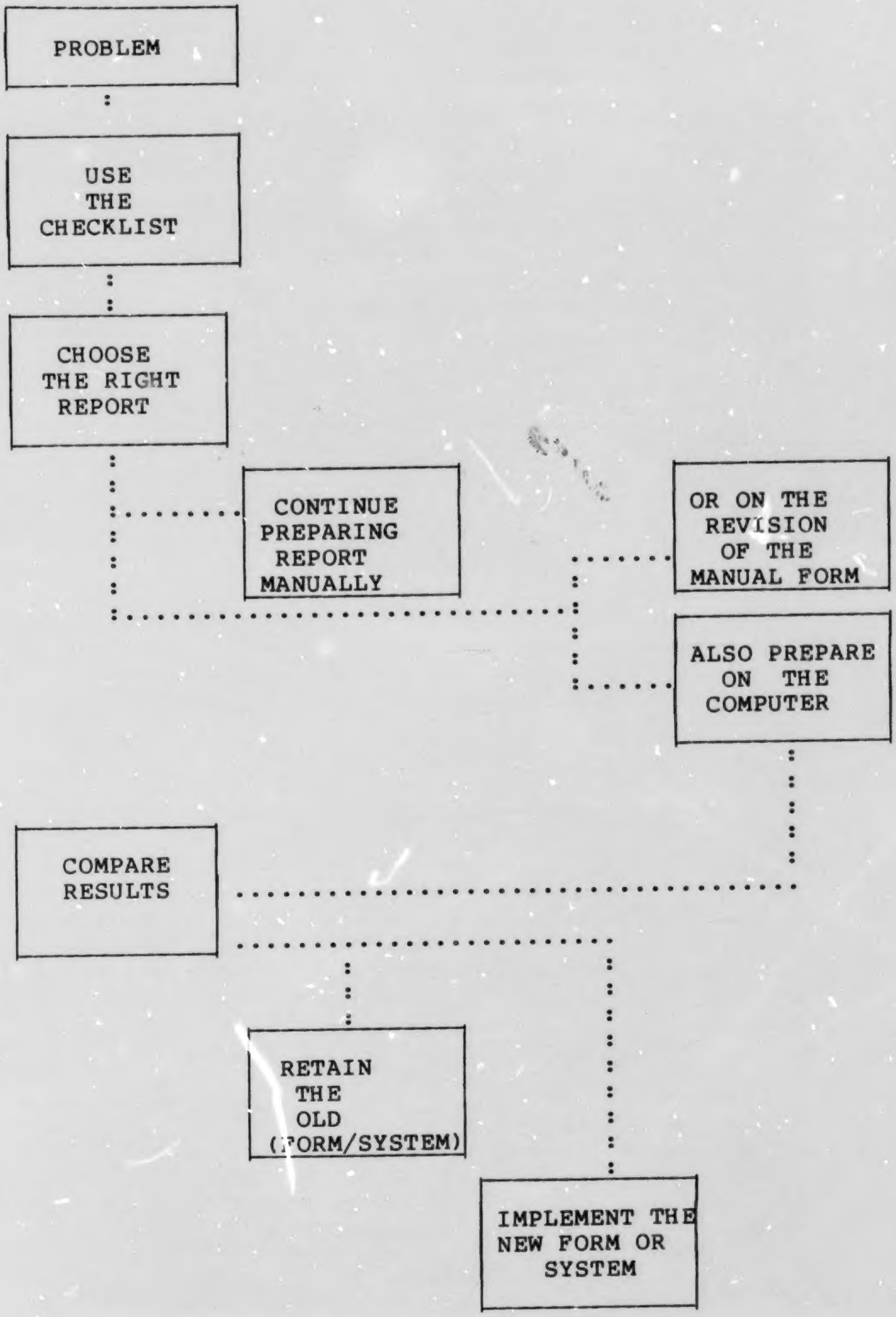
HOW IS A CHOICE MADE?

The three main categories described were FINANCIAL, STATISTICAL and MANAGEMENT INFORMATION. When deciding whether or not to collect data, a person should always ask 'what will it be used for?'. The answer to that question should guide you as to which category is applicable (sometimes all three may be). When deciding what kind of report is needed, analyze where the data will come from, who needs to have access to the information supplied, how quickly the report is needed, how often it needs to be distributed, whether computer is needed, whether computer paper is adequate or whether the report needs to be on white paper stock, whether each recipient needs their own copy or whether a master copy can be circulated. If you use a checklist, you will have many of your questions answered and can then decide what's necessary.

	FINANCIAL	STATISTICAL	MANAGEMENT INFORMATION	HOW OFTEN
WHO SUPPLIES (IN)				
WHO RECEIVES (OUT)				
NUMBER COPIES				
DIST/CIRCULATE?				
TYPE OF PAPER				
COMPUTER?				
MANUAL?				
WHERE FILED?				
RETENTION TIME?				

Sometimes the output is typed manually or printed by a computer; but is not meant to be the final document. Instead, the output is sent to people who will fill in blanks or add information and return the document to the sender. Then the output is referred to as a TURNAROUND DOCUMENT (TAD). Such documents are very useful when it takes several people to complete the data necessary to make up a record. When figures are involved (such as Social Security Numbers or dollar amounts), the TAD is very useful in avoiding such things as copying a number wrong, transposing some figures when copying over to another document; the TAD is also useful in showing a person what the existing record is like so that only necessary changes are made and time isn't wasted in recording information that already exists.

When deciding whether or not to utilize a turnaround document, timing must be considered. Does time allow the original information to be captured, coded onto a form with enough room for additional information to be inserted, then delivered back to the sender? If time, mailing costs, and/or lack of sufficient staff makes a TAD seem undesirable, computerization may be explored. If feasible, the turnaround document concept may be implemented using terminals at several locations instead of sending the physical document to those locations. Then the original format of the TAD can be input, the next person can add their data; it can be transmitted to the next person (who adds their piece of data); and so on until it is completed and transmitted back to the source location. Let's discuss the computer in more detail in the following chapters.


PROBLEM
USE THE CHECKLIST
CHOOSE THE RIGHT REPORT
CONTINUE PREPARING REPORT MANUALLY
OR ON THE REVISION OF THE MANUAL FORM
ALSO PREPARE ON THE COMPUTER
COMPARE RESULTS
RETAIN THE OLD (FORM/SYSTEM)
IMPLEMENT THE NEW FORM OR SYSTEM

WHAT INDICATES THAT THE RIGHT CHOICE WAS MADE?

When no more financial, statistical, or management information questions are asked. When bosses, peers, subordinates no longer have those questions. When answers are available to questions asked by any of the mentioned groups. If only part of the answer is available, the report can either be expanded, or a new report devised to supply the missing data. Don't be afraid of failure; however, to prevent prematurely announcing that a report is the answer to everyone's prayers, a team should be formed to be involved in the initial input, output and testing of the data. If a manual system already exists, the new report should be tested concurrently; don't get rid of the old one until there is reasonable proof that the replacement report is better. A little extra time during testing is usually well worth it.

ANSWER	QUESTION
C.	A report can be a written record or summary. What types of reports did we discuss in this chapter? A. oral reports given after observing for some time B. testimony given on another's behalf in a court of law C. financial, statistical and management information D. all of the above E. none of the above
B.	Which of the following statements is true? A. A document is a 'report' only if a computer prepared it. B. A report can be handwritten, typed, or written by a computer. C. If a document contains columns of figures, it is no longer a report. D. None of the above
D.	Which of the following is considered a Turnaround Document? A. A report with enough room for items to be added by someone else. B. A computer output with some items filled in and others to be added. C. A handwritten, typed, or computer-generated document with enough room for items to be added. D. All of the above. E. None of the above.
C.	Which of the following is an indication that the right report was chosen? A. When boss says 'this doesn't tell me anything'. B. When co-workers say 'so, what's that supposed to mean?'. C. When self/boss/peers/subordinates learn from the report and it answers pertinent questions. D. All of the above. E. None of the above.
D.	Which types of reports may include columns of figures? A. financial B. statistical C. management information D. all of the above E. none of the above
A.	Before one method is replaced by another, testing should take place; however, most people feel that A. a little extra time during testing is usually well worth it B. testing is a waste of time - jump right in and change C. once a method exists it can't be modified, only replaced D. never involve more than one person in testing a method E. none of the above

III. DOCUMENTS: Input, source, and turnaround

Documents which are considered 'input documents' can be the 'source document' with all of the original entries. However, more often, input documents have been coded by a person who used the source document and extracted only the necessary information (such as the letters or numbers which represent the answers to a sequence of questions or a sequence of blanks which were filled in). This coding is redundant and may be a waste of time unless the original form is so cumbersome that it would take a data entry person longer to find the answers on that form than it would take the additional person to code the information onto a separate form. When storing the data, it is necessary that the same field have the same meaning and be found in the same physical place on each and every record. Then when the data is retrieved, comparisons take on meaning, summaries can be created, items can be counted, totals of each item can be manipulated and/or calculated. As the following example points out, such comparisons cannot be made without standardization and uniformity.

A=Apple, B=Banana, C=Cherry, O=Orange, P=Pear

C	P	O	A	B	C	P	O	A	B	C	P	O
A	B	C	O	P	C	P	O	A	B	C	P	O
P	O	C	B	A	C	P	O	A	B	C	P	O
1	2	3	4	5	1	2	3	4	5	6	7	8
CAN'T ADD!!!					OKAY TO ADD THESE!!!							

You cannot add cherries to an apple and have the result be meaningful; however, if all cherries are found in the first field, you can count up all the field '1's of every record and get a total number of cherries.

The same holds true for the pears in field 2, the oranges in field 3, the apples in field 4 and the bananas in field 5.

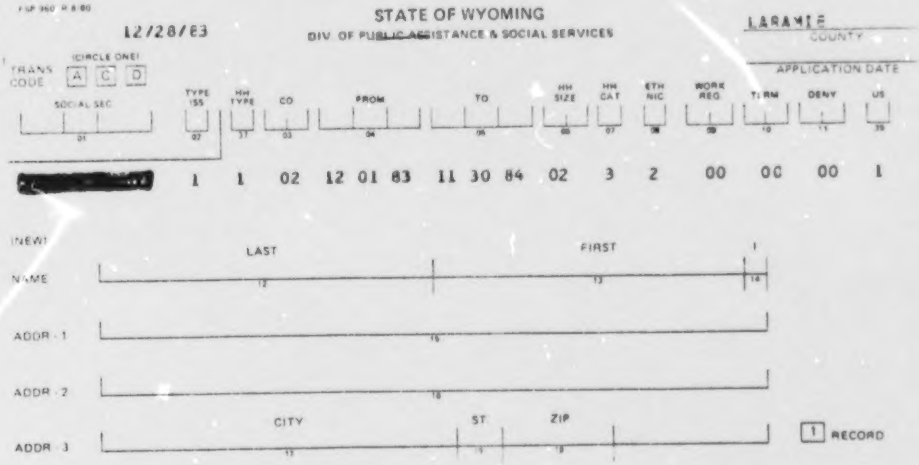
In real life or real records, fields can occupy more than just one position. When adding up a field that represents dollar amounts it is always wise to figure out what the maximum amount could be and include a space for the dollar sign and any commas and/or decimal points. So, if each of the above fields could have a value up to but not including $10,000.00, the number of spaces allowed would be 9 ($9,999.99) and the space allowed for the total would have to be large enough (for example, if adding up 10,000 such records, you would have to allow 14 spaces ($9,999.99 x 10,000 = $99,999,999.99).

If you were creating a manual form to capture the above data, you would need to keep in mind the amount of space needed. The same holds true for setting up records and files on computers. Programs are written to handle the data and tell the computer how much room or storage is needed to accumulate, calculate and store the results.

Turnaround documents usually take all or part of the data originally supplied and leave space for new or additional data to be added on the same document. That way, the existing data is not rewritten (thus redundancy is avoided) and the opportunity for errors in copying data is reduced.

The following is a sample of a Food Stamp Form 960.

1. The first time through the system, a completed 960 is submitted. (Can be either handwritten or typewritten).
2. After that form is keypunched and entered into the computer, the computer generated a printed 960 (called a turnaround document).



FSP 960 R 8/80

12/28/83

STATE OF WYOMING
DIV. OF PUBLIC ASSISTANCE & SOCIAL SERVICES

LARAMIE
COUNTY

APPLICATION DATE

TRANS CODE (CIRCLE ONE) A C D

SOCIAL SEC	TYPE ISS	HH TYPE	CO	FROM	TO	HH SIZE	HH CAT	ETH NIC	WORK REG	TERM	DENY	US
[redacted]	1	1	02	12 01 83	11 30 84	02	3	2	00	00	00	1

(NEW) NAME LAST FIRST I

ADDR - 1

ADDR - 2

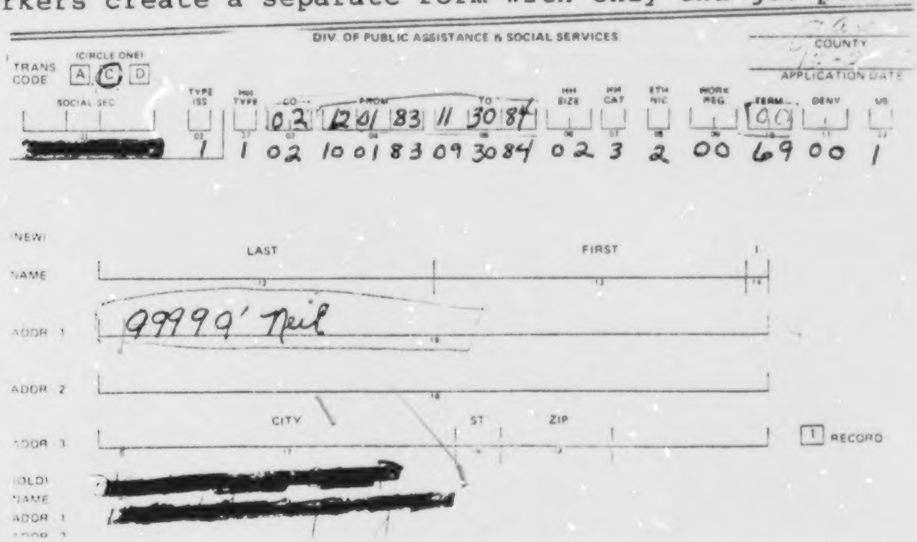
ADDR - 3 CITY ST ZIP

1 RECORD

3. Workers mark up the computer-generated turnaround document.

- OR -

4. Workers create a separate form with only changes pencilled in.



DIV. OF PUBLIC ASSISTANCE & SOCIAL SERVICES

COUNTY

APPLICATION DATE

TRANS CODE (CIRCLE ONE) A [✓ C] D

SOCIAL SEC	TYPE ISS	HH TYPE	CO	FROM	TO	HH SIZE	HH CAT	ETH NIC	WORK REG	TERM	DENY	US
			02	12 01 83	11 30 84					00		
[redacted]	1	1	02	10 01 83	09 30 84	02	3	2	00	69	00	1

(NEW) NAME LAST FIRST I

ADDR 1 99999' Neil

ADDR 2

ADDR 3 CITY ST ZIP

1 RECORD

(OLD) NAME ADDR 1 ADDR 2 [redacted]

Note: The SSN, Name & Addresses are blocked out for this sample and all the samples on the following pages.

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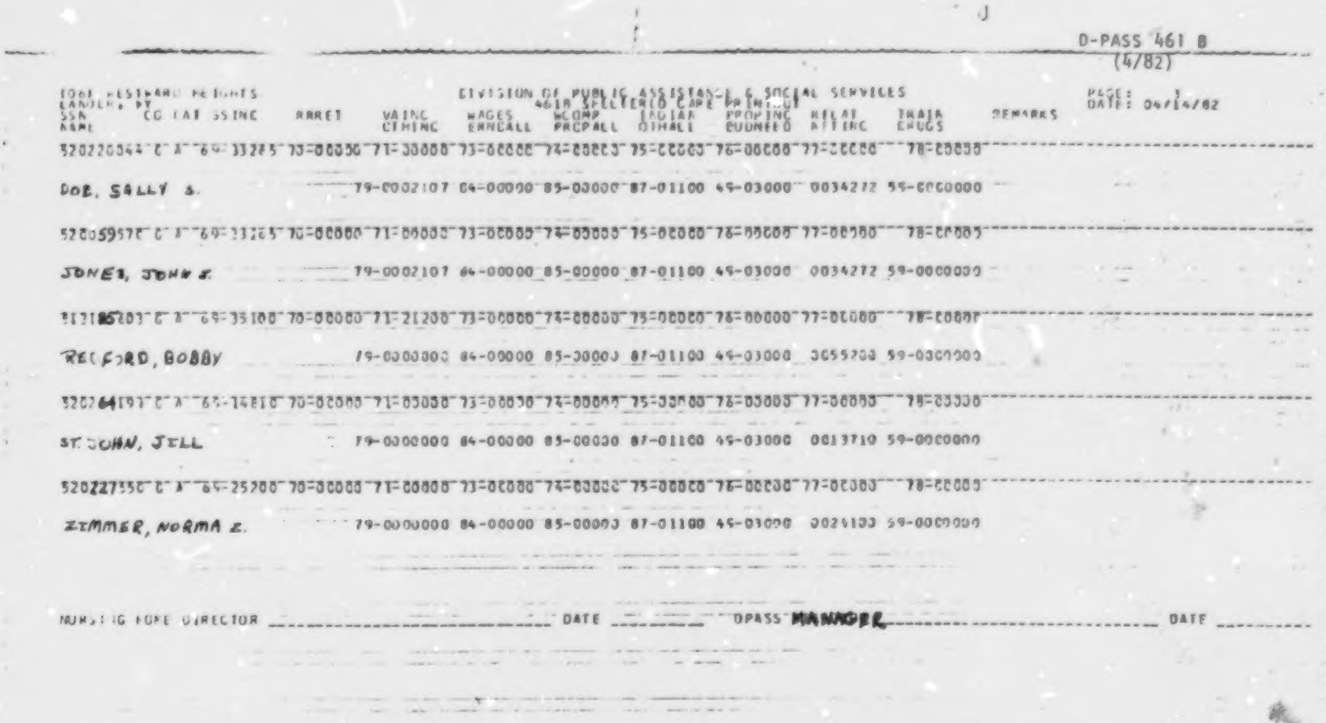
This sample of a Nursing Home Document shows that besides the preprinted data, the worker can cross out existing data and replace it with current data and/or remarks. Such information can be written or typed and the signed turnaround document is returned for input into the computer to update the master files and create new turnaround documents.



```
                                                                                              D-PASS 461 B
                                                                                                 (4/82)
1001 WESTWARD HEIGHTS                          DIVISION OF PUBLIC ASSISTANCE & SOCIAL SERVICES         PAGE:   1
LANDER, WY                                          4618 SHELTERED CARE PRINTOUT                       DATE: 04/14/82
SSN        CO CAT SSINC     RRRET      VAINC     WAGES     WCOMP     INDIAN    PROPINC   RELAT     TRAIN      REMARKS
NAME                                   OTHINC    ERNCALL   PRCPALL   OTHALI    CUDNEED   ATTINC    DRUGS
520220344 C A 64 33285 70=00000 71=30000 73=00000 74=00000 75=00000 76=00000 77=00000   78=00000 ----------------------

DOE, SALLY S.           79-0002107 84-00000 85-00000 87-01100 49-03000 0034272 59-0000000

520059570 C A 69 33265 70=00000 71=00000 73=00000 74=00000 75=00000 76=00000 77=00000   78=00000 ----------------------

JONES, JOHN S.          79-0002107 84-00000 85-00000 87-01100 49-03000 0034272 59-0000000

512185203 C A 69 35100 70=00000 71=21200 73=00000 74=00000 75=00000 76=00000 77=00000   78=00000 ----------------------

RECFORD, BOBBY          79-0000000 84-00000 85-00000 87-01100 49-03000 3655700 59-0000000

520264193 C A 69-14810 70=00000 71=00000 73=00000 74=00000 75=00000 76=00000 77=00000   78=00000 ----------------------

ST. JOHN, JILL          79-0000000 84-00000 85-00000 87-01100 49-03000 0013710 59-0000000

520227550 C A 69-25200 70=00000 71=00000 73=00000 74=00000 75=00000 76=00000 77=00000   78=00000 ----------------------

ZIMMER, NORMA E.        79-0000000 84-00000 85-00000 87-01100 49-03000 0024133 59-0000000


NURSING HOME DIRECTOR ______________________ DATE ________ DPASS MANAGER ______________________ DATE ________
```

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In this sample from the Youth Needs Survey, items #87-90 have the appropriate response number circled (a data entry operator can then enter that number into the computer).

87. Do you plan to graduate from high school?

[✓ Yes...X 1]
No...___2
Don't know for sure...___3
Graduated...___4

88. What do you plan to do after high school?

[✓ Full time employment. X 1]
College..............___2
Junior college.......___3
Vocational training..___4
Military.............___5
Undecided............___6
Others______________7

89. Do you think your occupation will be similar to your mother's or father's?

Yes...___1
[✓ No....X 2]
Maybe...___3

90. Do you have any specific career goals that you would like to achieve?

Yes...___1
[✓ No....X 2]
Uncertain....___3

Item #91 required a written or word response. The user had to match the word with a numeric code found on a preprinted list; then that code was added in the margin. This allows the masterfile to use a two position field for the response to item #91 instead of wasting space by leaving room for a huge field which may or may not be filled in.

91. What field of employment do you plan to enter in the future?

uncertain___1 [✓ 15]

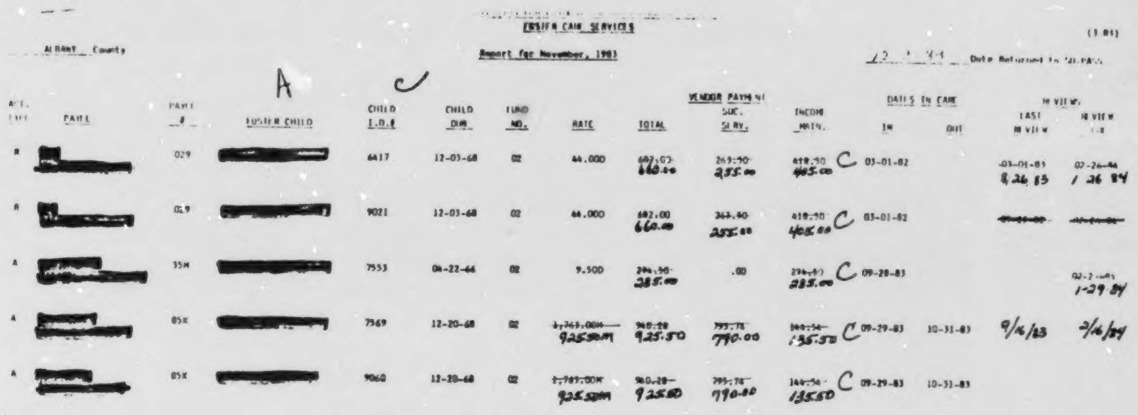
92. Do you feel your educational experiences so far will prepare you to achieve your career goals?

[✓ Yes...X 1]
No...___2
Don't know___3

93. Would you like to stay in this community after you have completed your formal schooling?

[✓ Yes...X 1]
No....___2

The Foster Care worksheet is created from a form supplied by the workers. The data is keyed into the CPT word processor and results in the printout below.



FOSTER CARE SERVICES

ALBANY County

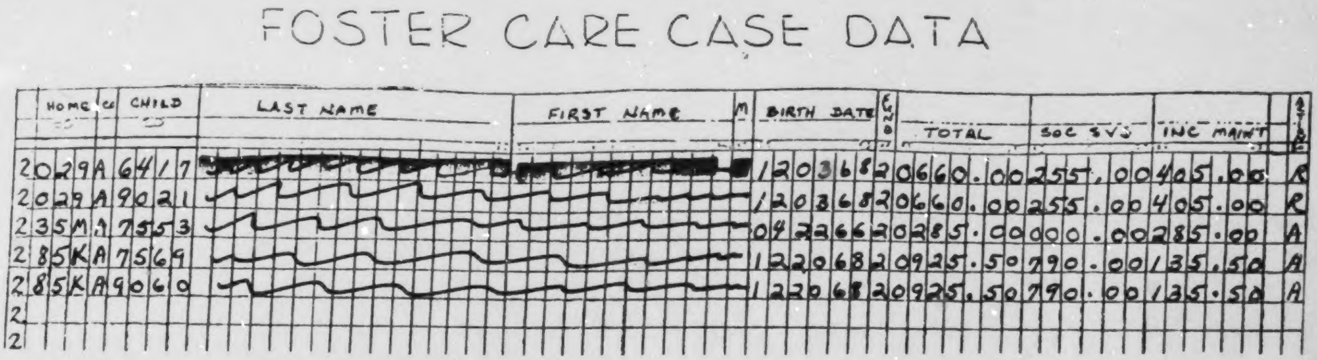
Report for November, 1983

Date Returned to

A ✓

ACT. TYPE	FAMILY	FAMILY #	FOSTER CHILD	CHILD I.D.#	CHILD DOB	FUND NO.	RATE	VENDOR PAYMENT TOTAL	SOC. SERV.	INCOME MAINT.		DATES IN CARE IN	OUT	REVIEW LAST REVIEW	REVIEW DUE
R	[redacted]	029	[redacted]	6417	12-03-68	02	44.000	~~682.03~~ 660.00	~~269.50~~ 255.00	~~418.50~~ 405.00	C	03-01-82		~~03-01-83~~ 8 26 83	~~02-26-84~~ 1 26 84
R	[redacted]	029	[redacted]	9021	12-03-68	02	44.000	682.00 660.00	~~263.50~~ 255.00	~~418.50~~ 405.00	C	03-01-82		~~[illegible]~~	~~[illegible]~~
A	[redacted]	35M	[redacted]	7553	04-22-66	02	9.500	~~294.50~~ 285.00	.00	~~294.50~~ 285.00	C	09-28-83			~~02-2[illegible]~~ 1-29-84
A	[redacted]	85K	[redacted]	7569	12-20-68	02	~~1,763.00M~~ 925.50M	~~940.28~~ 925.50	~~795.78~~ 790.00	~~144.54~~ 135.50	C	09-29-83	10-31-83	9/16/83	3/16/84
A	[redacted]	85K	[redacted]	9060	12-20-68	02	~~1,763.00M~~ 925.50M	~~940.28~~ 925.50	~~795.78~~ 790.00	~~144.54~~ 135.50	C	09-29-83	10-31-83		

The printout is sent back to the worker for subsequent updates and revisions which are sent back for updating the system (thus the word turnaround document). In this instance, two systems are maintained, the form itself on the CPT word processor, and the payment system on the host computer.



FOSTER CARE CASE DATA

	HOME	CO	CHILD	LAST NAME	FIRST NAME	M	BIRTH DATE	FUND	TOTAL	SOC SVS	INC MAINT	
2	029	A	6417	[redacted]	[redacted]		120368	2	0660.00	255.00	405.00	R
2	029	A	9021	[redacted]	[redacted]		120368	2	0660.00	255.00	405.00	R
2	35M	A	7553	[redacted]	[redacted]		042266	2	0285.00	000.00	285.00	A
2	85K	A	7569	[redacted]	[redacted]		122068	2	0925.50	790.00	135.50	A
2	85K	A	9060	[redacted]	[redacted]		122068	2	0925.50	790.00	135.50	A
2												
2												

A copy of the printout is sent to a fiscal technician to be 'coded' onto the coding sheet above; the data is sent to the host computer; payments are made.

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ANSWER	QUESTION
D.	The 'source document' can also be which of the following? A. input document B. turnaround document C. output document D. Both A&B E. None of the above.
D.	Under which of the following conditions should source data be coded onto a separate form instead of using the source document? A. When data entry time is important. B. When the source document is cumbersome. C. When it would take a data entry person longer to find the data on the form than it would take an additional person to code it onto a new form. D. All of the above. E. None of the above.
A.	The values in fields can only be added up or calculated if those values have been assigned in a standard or uniform manner. In order to do this, the person collecting the data must know in advance what the format must be and what the standards are. What old adage applies here? A. You can't add apples and oranges. B. You can't teach an old dog new tricks. C. You can't make a silk purse from a sow's ear. D. All of the above. E. None of the above.
C.	Turnaround documents usually take all or part of the data originally supplied and leave space for new or additional data to be added. This is an attempt to: A. Copy data over and over again. B. Rewrite the original data in a new way. C. Avoid redundancy and the chance of errors in copying over the data. D. Fill up as much space as possible on the form. E. Accumulate, calculate and store data.
B.	Some ways to indicate which pieces of data are to be captured include: A. Crossing them out with a marking pen or 'white-out'. B. Circling the data, making codes in the margin, copying over just the pertinent data on a separate sheet. C. Assigning a secret code, the meaning of which nobody knows. D. All of the above. E. None of the above.

IV. WORD PROCESSORS AND COMPUTERS

It's common practice to send a finished typewritten copy of something to a printing establishment to get multiple copies for distribution. To get that final typewritten copy, it has often been necessary for a person to type the text or words over and over again. That's the reason word processing was created. Electronic or memory typewriters (with or without video screens) capture words through the use of keyboards. Once captured, characters, letters, words, sentences, paragraphs and even pages can be added, changed, deleted, moved, copied and stored for future viewing and/or printing. Text may be entered just once. When page lengths change because of adding or deleting something, only the additions/deletions need to be dealt with. When it's time to print the document, the word processor automatically moves the text wherever necessary to fill up old pages and start new pages according to a previously assigned page length.

When you need special indentations (to surround a picture or some graphics for instance) the word processor does this automatically either by commands included with each line or commands given (at the beginning of the paragraph or at the time of printing).

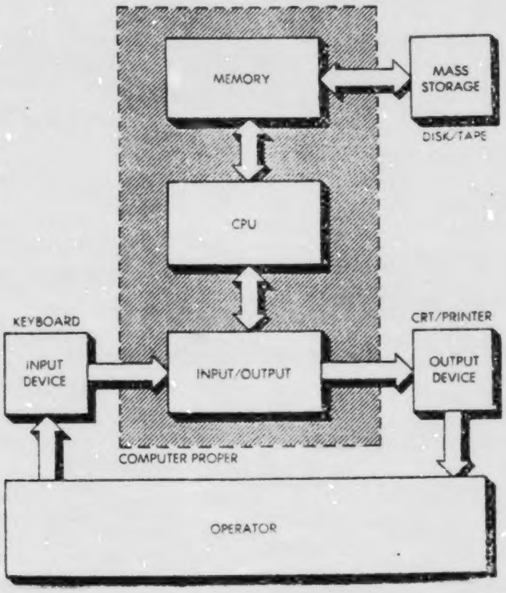
Word processor can be a misnomer. Word processing equipment often processes data as well. Most word processors include software capable of performing mathematical calculations, electronic spreadsheets, and actual computer programs. The associated printers can be for high quality output, high quantity output, low quantity and/or quality where all that is needed is a 'hard' copy of the captured text so that it can be further edited or shared with someone who insists on having something typewritten instead of viewing the text on a video terminal. When the text has been edited and perfected, most likely a high quality printer will be needed for the final printing. Many word processors store the data in their own processing unit; however, many other word processors store the text on floppy disks or diskettes. It's possible to use magnetic tape as storage media, but tapes require special 'tape drives' and are not commonly used for mundane word processing applications. Hard disk drives can store from 5 to 25 meg (meg = megabytes = million bytes) and multiple drives can usually be added to the processing unit as additional storage is needed.

Webster's defines a computer as one that computes; a programmable electronic device that can store, retrieve, and process data. Computerese is jargon used by computer technologists.

Data processing defines a computer as a device capable of solving problems by accepting data, performing prescribed operations on the data, and supplying the results of these operations.

HARDWARE is the actual equipment used for either word or data processing, including the terminal, keyboard, video display or screen, and printer. Peripheral equipment such as card readers and sorters, bursters and decollators, tape and disk drives, sheet feeders and tractor feed mechanisms are not the actual hardware.

SOFTWARE consists of the programs or sets of instructions which have meaning to the processing unit. Certain words have specific meanings which activate the program and cause the instructions to be carried out. Then as data is read, the program instructions are followed over and over again.



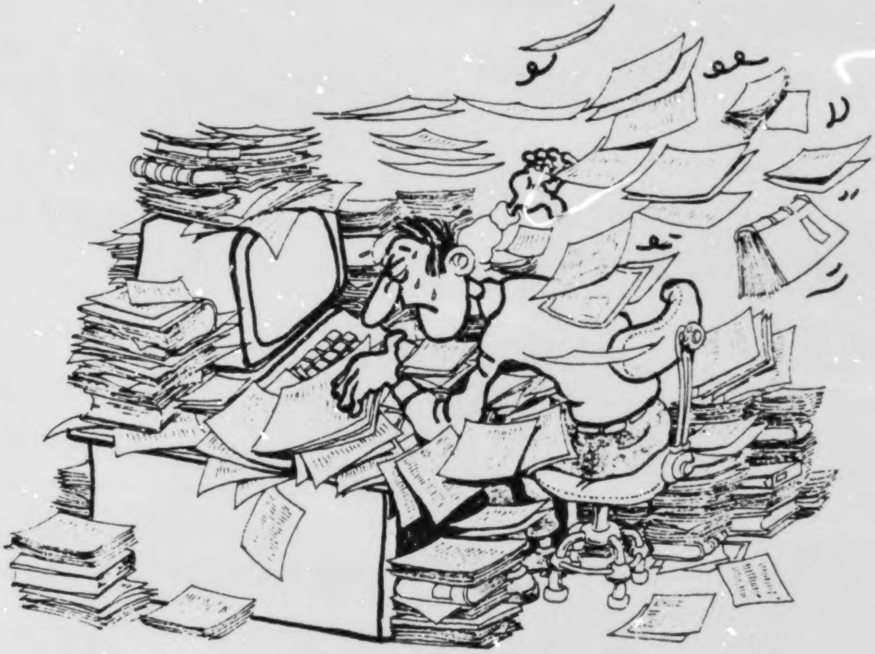
Software is written in many languages. The current state of the art is for the chosen language to be as near like everyday English as possible. Instead of sophisticated and complex commands, everyday words should be understood by the computer or processing unit. Instead of having to memorize commands which are unfamiliar, it makes much more sense to use familiar words as commands. (Words which are easily understood and easily remembered are less likely to be mis-used.) Software can be written as necessary to fit a certain situation; it can be written 'generically' and disseminated widely; it can be written by programmers strictly for financial gain; it can be written to gain recognition and prestige; it can be written to explore some new horizon or frontier rather than to meet an existing need. In fact, much of the software on the market now is a result of boredom and/or the desire to innovate. Of course, wherever a need exists, software can usually be written to meet that need. The contributing factors to be considered are whether or not the need justifies the amount of time and resources to write and debug the program, whether or not the program will be used one time or re-used, and whether or not the program can be readily used and interpreted by others besides the programmer.

Unless information is stored after it is gathered, it will be lost when the computer power is turned off. Some word processors have a special 'out' key for storing data; some other processors use verbs such as 'store' or 'out' in order to store data. Data files often have to be 'closed' before they can be stored; some programs perform the storage function when the 'close' verb is used. In any event, a file or document should be finished and/or closed and also stored before power is turned off in order to prevent loss of data.

Documentation is a means of explaining the program; the input, process and output. Remarks within the documentation explain not only what is taking place, but why it is taking place and what the expected results or outcome will be. Documentation is very necessary because of a mobile society and rapid turnover in personnel (users of the programs as well as the writers of programs).

Documentation is essential to the effective and convenient use of a computer installation. Documentation must be complete, current, easy to use, and well-organized. Three kinds of documentation must be available: hardware documentation, software documentation, and a record of changes or modifications to the hardware or software.

This example shows what documentation should not be like.



32

ANSWERS	QUESTIONS
A.	Word processor can be a misnomer. "Word Processors" can be used for data and "data processors" can process words. A. Word and data processing both require software. B. If software exists, hardware is not necessary. C. Software writers do not worry about hardware. D. None of the above statements are true. E. All of the above statements are true.
D.	Hardware is actual equipment and includes the following: A. keyboard B. processing unit C. terminal/video display D. all of the above E. none of the above
B.	Software consists of the programs or sets of instructions which have meaning to the processing unit; but A. software is always magical and secretive. B. pre-defined software words must have universal meaning C. software is confusing if it is too English-like D. all of the above. E. none of the above.
D.	Among the reasons for documenting the input, process and output of a program are: A. rapid turnover of staff (both users and programmers). B. mobile users and programmers change jobs often. C. even when staffs are constant, users and/or programmers can forget the intricacies of programs D. all of the above. E. none of the above.
C.	Word processing is a means of storing and moving data. It is also a means of editing, checking grammar and spelling, and producing finished printed copy. But, A. it can't process data. B. it can't process numbers or special characters. C. it still requires software or programming language D. all of the above. E. none of the above.
D.	Peripheral equipment includes the following: A. tape drive B. disk drive C. burster, decollator D. all of the above E. none of the above

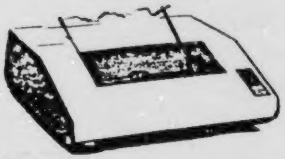
V. WORD PROCESSING OUTPUT AND PRINTERS

The word processor output can be text or figures (even reports of the three main types previously described: management information, statistical and financial). To produce this information in the best possible format, more choices are necessary. If a person just wants to see the information printed on a sheet of paper (hard copy), a low speed, low quality printout can be obtained from a dot matrix printer. A dot matrix forms characters by printing dots in the proper shape (the higher the density of the printed dots, the more readable the characters). See the dot matrix printer in the diagram on the following page. Character printers are of a higher quality and usually cost a great deal more since they are faster and print characters per second (CPS), line per second/minute (LPS/LPM).

See the line printers in the diagram on the following page. A person also needs to determine how wide the report will be (number of print positions) and whether or not multiple copies will be needed (carbons or NCR (no-carbon-required) paper). When dealing with special forms (such as certificates, permits, warrants) a person must also decide if the printer should be letter quality with paper feed sensors at the bottom or the top. See the forms access printer in the diagram on the following page. Top feed sensors need to have two or three forms wasted since it takes that many for the sensors to determine that forms are present and printing should begin. Bottom feed sensors determine the presence of forms and thus printing begins at the top of the first form and waste is avoided. When not dealing with special forms, this may not become a consideration. It's usually a one-time cost to have the bottom-feed sensors used instead of the top-feed type. Some vendors do not even charge for this service; the user merely has to make their requirement known at the time the order for a printer is placed.

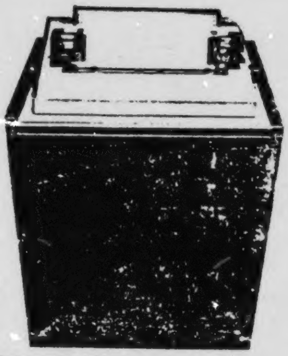
If a high-quality, high-speed printer is used, the user may decide to print short documents over and over instead of sending a finished copy to a printer to have multiple copies made. However, some research should be conducted before that decision is made. Will the printer be needed for other applications? Will a data entry operator need to spend time monitoring the printer instead of creating new documents? How much will it cost to have a printing establishment make the multiple copies? How long will it take the printing establishment to make the multiple copies? How long is the document in question? When these questions are answered, the decision should be much simpler. Then over time, criteria can be established and a checklist created with minimums and maximums spelled out. In some instances, an ink jet or laser printer may even be feasible if quantity and quality justify the cost.

Below please find examples of several types of printers with a scenario of the paper path of most printers.



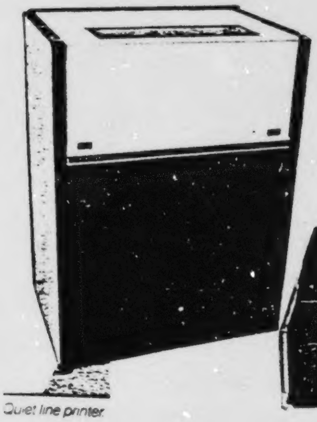
340 cps dot matrix printer

Our 340 cps dot matrix printer is the ideal choice for medium speed applications. It offers many line printer features, but at character printer prices. Bi-directional, it can print 200 lpm in full-line 132 column formats. There's also tractor feed, electronic top-of-form, variable pitch, and selectable lines per inch.

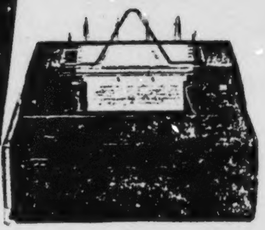


30 cps matrix printer.

For low volume printing such as in remote locations, you'll find our 30 cps dot matrix printer an exceptionally cost-effective choice. A wider version of our famous Model 43 printer mechanism, it has a proven record of reliability. It offers tractor feed and 132 columns, and comes in tabletop and table-mounted cabinet styles.

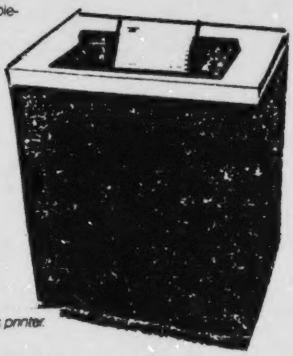


Quiet line printer.



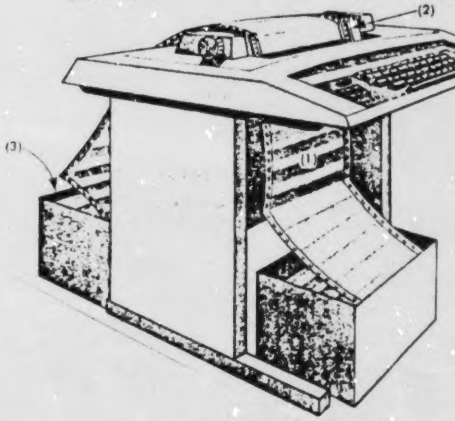
Tabletop line printer.

Our line printers can operate at 300 lpm and are available in an 80 column friction feed version, and in 80 or 132 column tractor feed models. They're offered in the tabletop cabinets and, in the case of the 132 column version, in a floor-standing, quiet cabinet designed especially for the office environment.



Forms access printer.

There's even a unique 80 column forms access printer that gives immediate access to tickets, policies, receipts and other forms, with security and without the waste of forms and time that usually accompany these applications. This tractor feed unit advances forms by pushing them from the bottom of the form, rather than pulling them up from the top. As a result, every form gets



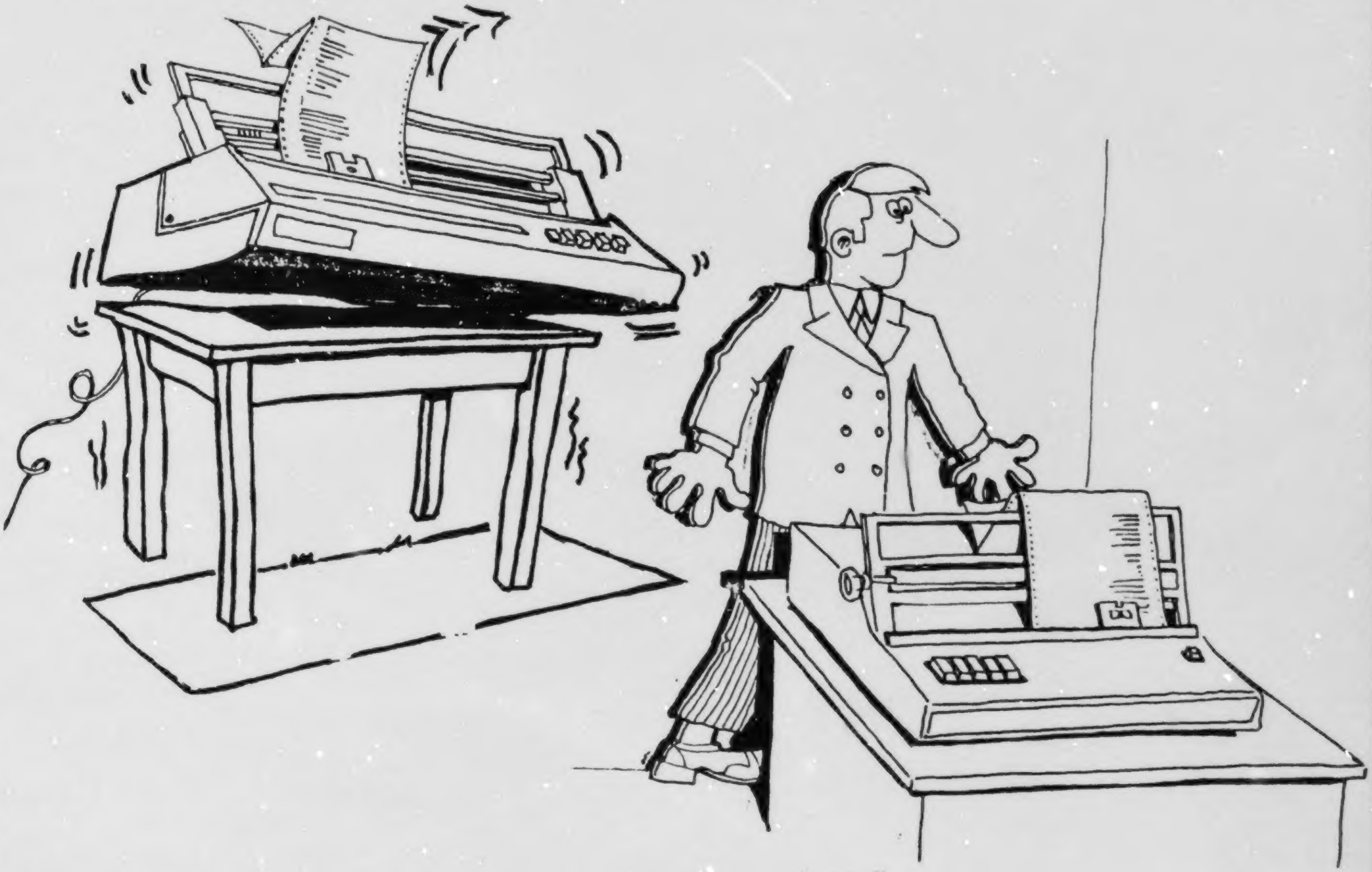
1) Paper is fed in from a box full of continuous paper or forms
2) Paper is held in place by tractor feed mechanisms with 'teeth' over which the perforated holes of the paper are put
3) Printed paper fan-folds back into a waiting box

Some tabletop printers reverse the above sequence. Paper feeds in from the back and the printed paper is pushed upward to a waiting tray or box.

Paper Path on a Printer

	PRINTING	
	INHOUSE	OUTSIDE
Will printer be needed for other applications?		
Will operator be needed for other applications?		
How much monitoring does printer require?		
Cost of creating documents each way:		
Length of time to print multiple copies:		
Number of pages in the document		
What quality is needed: laser or ink jet printer?		

It's also important to remember that printers need to be on a 'stable' table if they are table-top printers. Standalone printers need to be located far enough away from a wall so that paper can be loaded from the back, so that proper ventilation is maintained, and so that an operator can stand behind the printer to load paper and diagnose any problems that may exist.



	This Primer	Policy Manual
Is High Quality Important?	Yes	Yes
How Many Copies Required?	500	500
Where to be sent?	State & Co.	State & Co. Offices
Are graphs/illustrations required?	Yes	Yes
Results:	Print Outside	Print Ourselves

	Vital Records	Title 19 Profiles
What is it; form or text?	Form	Text
Carbons or NCR?	NCR	Either/Both
Batch or ad hoc request?	Counter/Both	Either/Both
For whom? Public or Staff?	Public	Staff
Results: top or bottom feed?	Bottom	Either/top okay

ANSWERS	QUESTIONS
D.	Checklists should be used for several purposes, among which are: A. decisions to print documents on our own computer's printer instead of sending to a printing house for multiple copies B. decisions to use standalone computing instead of communicating with host computers C. decisions regarding who should be on distribution lists D. all of the above E. none of the above
B.	Printers come in a variety of print styles, print speeds, and techniques for forming characters; so we know that A. dot matrix printers are similar to dot-to-dot drawings where you draw lines to connect the dots to see which character was formed B. dot matrix printers form characters with patterns of dots; the higher the density of the dots, the more clearly the characters appear C. high speed printers go from 0 to 60 in 5 seconds D. high speed printers could never be measured by the numbers of characters printed - measurement must be in lines or pages E. none of the above
C.	Many printers have devices called tractor feeds which have teeth or pins which hold paper or forms with strips on the sides with holes strategically located for the teeth or pins to hold the paper in place. A. tractor feeds can only sense paper which is fed into the printer after the third form passes through the teeth/pins. B. tractor feeds can only sense paper or forms if they are located below the platen or portion where the actual printing takes place C. tractor feeds can sense paper or forms either below or above the printing surface; the choice needs to be made according to each type of application to which the printer is put D. all of the above E. none of the above

VI. STANDALONE, COMMUNICATION WITH HOST, OR TIMESHARING

A more difficult checklist is involved when deciding "WHEN SHOULD I USE THE HOST COMPUTER AND WHEN SHOULD I INSIST ON STANDALONE COMPUTING?". When data bases or master files are small and manageable, standalone computing may be considered. When the application can be performed using pre-existing or packaged software, standalone computing may be considered, thus avoiding the cost of system development for use on a host computer. However, when volume, complexity, distance, and/or a great number of users becomes part of a system on a standalone computer, research should be conducted and a decision made as to whether or not the system should be put on a minicomputer or a mainframe instead. Each decision is, of course, unique. But again a checklist should be drawn up for each application showing who uses the data, where they are located, what volume of input/output occurs at each location, where the data should be stored and so forth.

	#characters	#records	#files	#systems
DHSS DPASS AFDC	460	50,000	11	3
How large is data base?	460/300/120	50,000*3	11 * 3	3
How many users per portion?	23 * 5			
Which locations use each?	Casper			
Designator (S=staff;R=remote)	R			
Miles from central site	180			
	:	:	:	
	:	:	:	
	:	:	:	

Results: Standalone or Communicate with host? Reply per location.

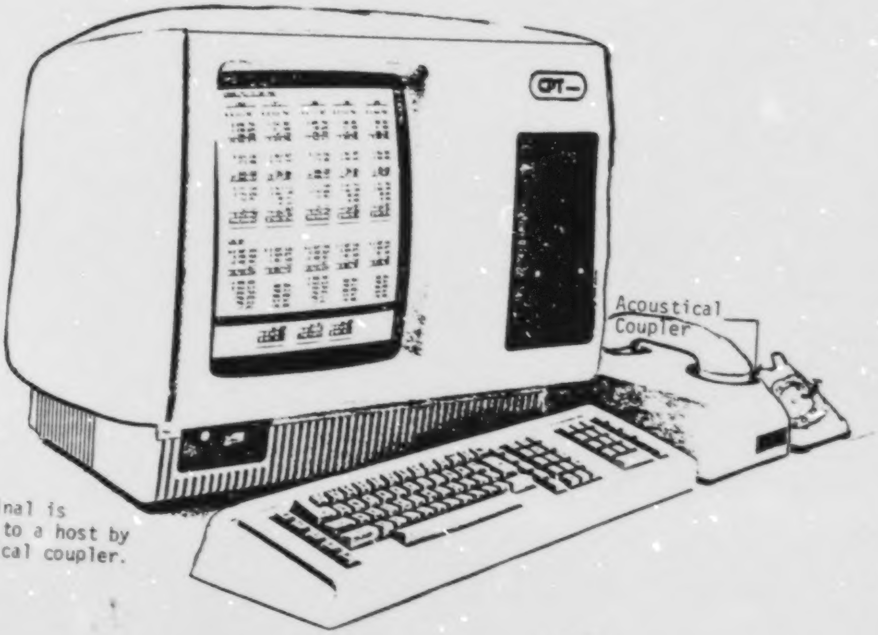
Note: This listing is a partial checklist. Each reply will show different results dependent upon the location and its responses.

An accompanying consideration is: "WHEN SHOULD I USE DIAL-UP AND WHEN SHOULD I USE ONLINE?". Webster's defines telecommunications as communication at a distance. A popular data processing definition is 'the science of communication by electric, electronic, or electromagnetic means over long distances such as telegraph, radio, and television'. Today phone lines and modems make telecommunications and networks possible. Modems are modulator/demodulators where the circuits of a carrier terminal are normally mounted together on a single panel and may have common elements. Pairs of modems (one located at the site of the terminal and one located at the host or another terminal with which communication is desired) act as controllers of the data as it is transmitted and received. The length of time necessary to transmit data needs to be considered. Batching data as opposed to entering ad hoc is a prime consideration. Dial-up may be feasible for batch mode, but not usually ad hoc; if you'd be dialing up more than 20 times per day at ten minutes per session for example.

For those who worry that their regular phone line would be tied up while transmitting (or that an incoming call might interrupt transmission), be aware that often dedicated lines are used for the terminal communications. The number is not a published number, so no phone calls should interrupt. If the phone is used for an outgoing phone call other than to transmit data, it's possible that an incoming transmission may cause interference or an audible beep or piercing sound during conversation. In such event, the phone should be replaced on the phone set and thus be ready for placement in the coupler and receiving data.

Timesharing is another alternative. Data processing defines timesharing as using a device for two or more purposes. The concept usually involves a host computer with many terminals using its programs and storage. Devices may be connected with circuits which are dedicated; or acoustical couplers may be used by calling a specified number for each file or program you wish to access. Acoustical couplers are modems which accommodate a telephone set and maintain the connection between the terminal and the host until a command is given which breaks the connection. These communications may be initiated by a person actually dialing the specified telephone number and placing the phone set in the coupler, or the terminal (computer) may have a dedicated line which is accessed by keying in the phone number or accessing the program which has the specified number as part of its instructions so that one computer actually calls the other in order to transmit or receive data.

TSO, which stands for timesharing option, is an IBM product which allows programmers (and specially authorized users) to directly access and add/change/delete programs stored on the host computer. TSO use is limited, however, because great amounts of storage are used by this application; and the more users on it, the slower the response time for all users of the host computer.



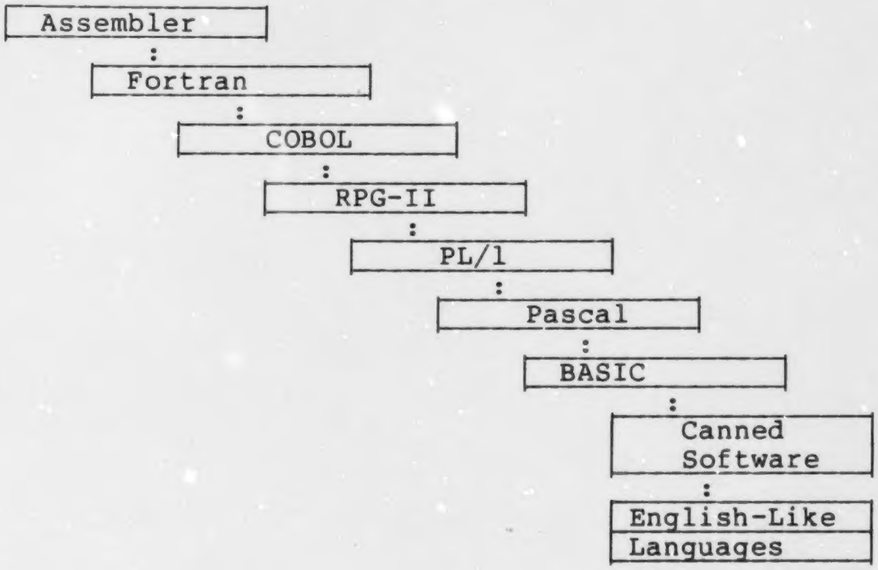
This terminal is connected to a host by an acoustical coupler.

ANSWERS	QUESTIONS
E.	Timesharing is the process of using a device for two or more purposes, usually by storing several applications on a single computer and allowing several users to access the data. It's timesharing A. if I let my neighbor use my typewriter B. if I spend my time doing my neighbor's taxes C. if I carpool to work, it's D. all of the above E. none of the above
D.	Standalone computing (using a small computer instead of communicating with a host or mainframe) may be considered when A. data bases or masterfiles are small & manageable; B. pre-existing or packaged software is available; C. isolated location and unaffordable phone lines; D. all of the above; E. none of the above
D.	Telecommunications is communication at a distance. It can be accomplished by which of the following A. telephone, telegraph, television; B. radio; C. electric, electronic, electromagnetic means; D. all of the above; E. none of the above
A.	Timesharing can also be defined as A. using a device for two or more purposes; B. one host sharing its power with one terminal; C. a means for programmers to use phone charge card; D. all of the above; E. none of the above
B.	A host computer is one which A. greets all users with a message similar to that which a host at a party would use; B. is large enough to store huge amounts of data and support many devices; C. is big enough to require a whole floor of a two-story building; D. all of the above; E. none of the above

VII. COMPUTERS, TERMINALS, LANGUAGES, DO'S & DON'TS

As microcomputers, minicomputers and distributed processing become more accepted, applications and languages become more user friendly. That means the necessary commands are more like the English language and less like the highly technical computer languages which are necessary to translate needs into zeroes and ones.

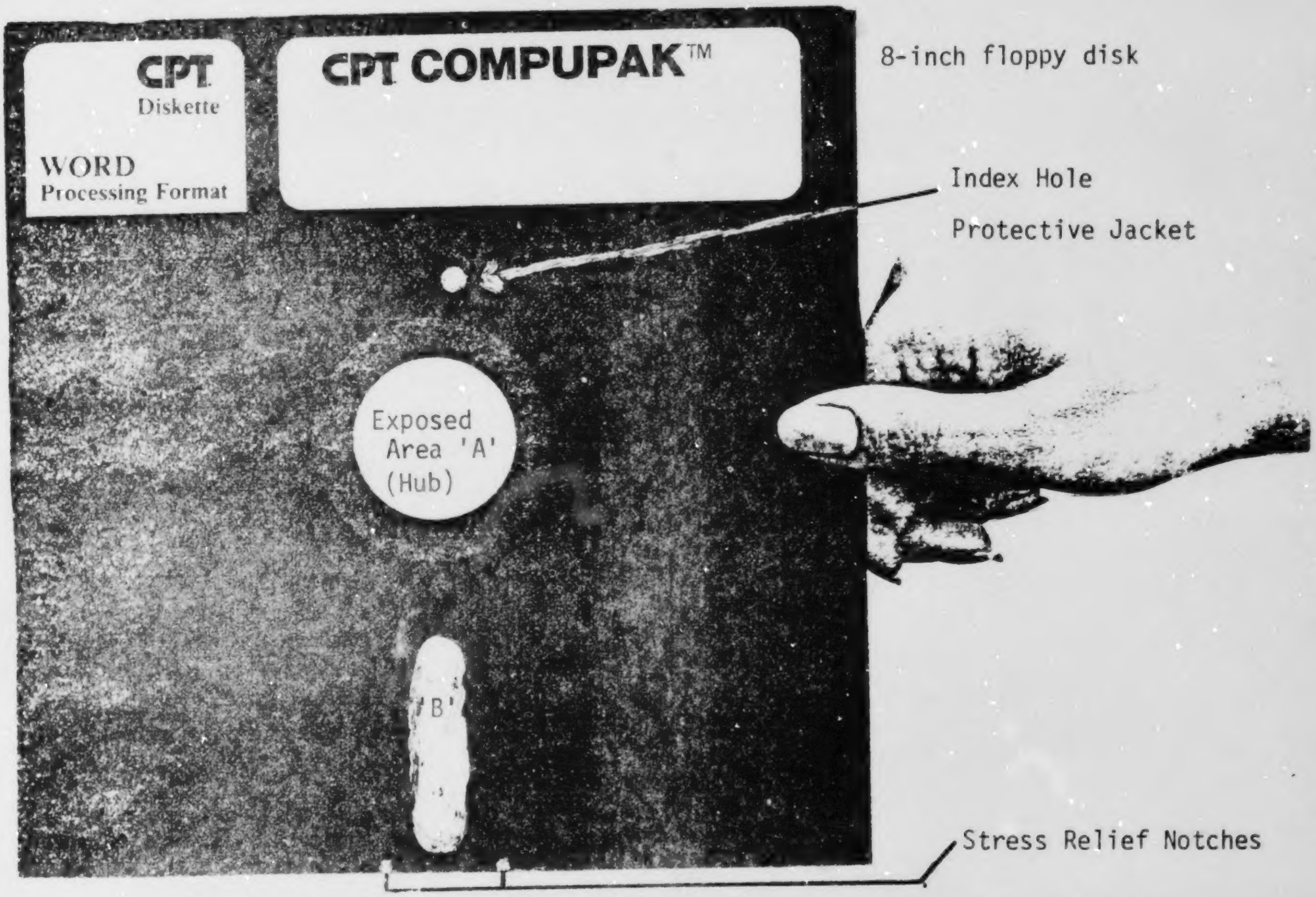
The Assembler language was an early attempt to humanize machine language; however, it was still primarily a lot of numbers and was very cumbersome to write and even harder to document. Fortran was tried, but it was also primarily numeric and full of formulae and very few words. COBOL (Common Business Oriented Language) was another attempt to use English; however, it took many words and reserved verbs to write a program. Debugging (the process of finding the problem in a program and fixing it) was also a problem. Then RPG-II and PL/1 came into being; but they were not significantly more English-like. When mini- and micro-computers evolved, languages such as BASIC and other MICROSOFT languages (with other brandnames) also evolved. Now the user manuals which accompany software packages explain the application and various uses rather than assigning words and giving very explicit and unique meanings for them. Some verbs are still 'reserved', but usually English is understood by the programs and translated into the binary zeroes and ones the computer understands. The schematic below shows some of the major languages used. The dotted lines between them indicate that these are not all-inclusive.



Word processors and most computers can use many types of media for storage. The most common type is the floppy disk, which is also called a diskette. Floppy disks usually come in two sizes, 5½" and 8-inch. Some of the newer word and micro processors utilize 3½ inch plastic cartridges with metal rings and protectors. Theoretically, these plastic cartridges can easily replace the floppy disks and can store more data; however, they would require replacement of all existing diskettes and any existing disk drive(s). So applications, storage, and volume of disks already utilized should be considered before deciding to change storage media size and/or disk drives.

Most diskettes can contain about 150 pages of text. By asking the computer the status of the system, a message is displayed to tell you how much disk space is left to use. In some instances, such as on the CPT word processor, an audible tone sounds and the message is displayed when you try to enter more data when the disk is already about 99% full. Such warning avoids losing data if it is keyed and there is no room to store it.

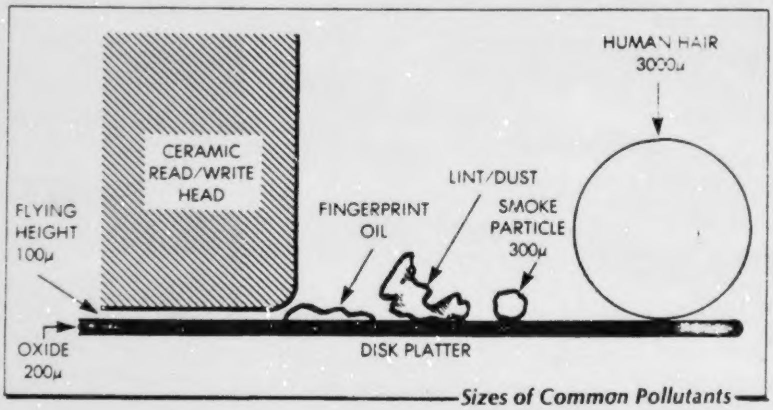
The diagram below shows an 8 inch floppy disk with a protective jacket, hub, index hole, stress relief notches, and head access aperture.


CPT
Diskette
WORD
Processing Format
CPT COMPUPAK™
8-inch floppy disk
Index Hole
Protective Jacket
Exposed
Area 'A'
(Hub)
'B'
Stress Relief Notches

Exposed Area 'B' (Do not touch exposed areas 'A' and 'B')
(Head Access Aperture)

Special diskettes with cleaning capability are used to clean disk drives; however, many instructions from vendors recommend cleaning too often. This may be an attempt to sell higher volumes of the cleaning products. So the user should determine from their own usage just how often cleaning is necessary; usually every 3 to 6 months is a guideline.

The diagram below shows why cleaning is necessary.



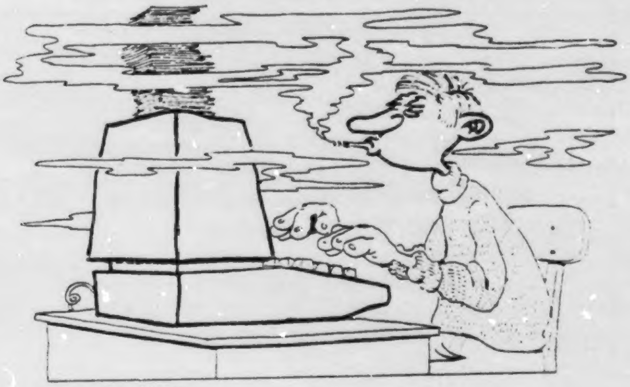
Sizes of Common Pollutants

There are many do's and don'ts associated with diskettes. Diskettes should not be laid upon a printer (especially if it is printing) since the printing activity may distort the data or even make the diskette completely unreadable. This problem may go undetected for quite some time, then all of a sudden access to the data may become impossible. Diskettes located too near a telephone may encounter the same problem; data becomes either distorted or impossible to read. This is due to the electromagnetic field which is present in such devices as telephones, copy machines, refrigerators, color televisions, and a variety of devices. Even car keys, screw drivers and paper clips are a potential magnetic hazard which may wipe out data on a diskette. Static electricity generated by just walking across a carpet may destroy data on a diskette if you don't 'ground' yourself before touching the diskette (by touching some other metal object first). Fumes and vapors exist in such substances as nail polish and remover, fluids used in copy machines, and some adhesives. Such items should not be located or used near the terminal and/or its storage media. The x-rays taken at airports may not destroy the data on a diskette; however, the instruments and machines which house the x-ray may have electromagnetic fields which would destroy the data or make it impossible to read.

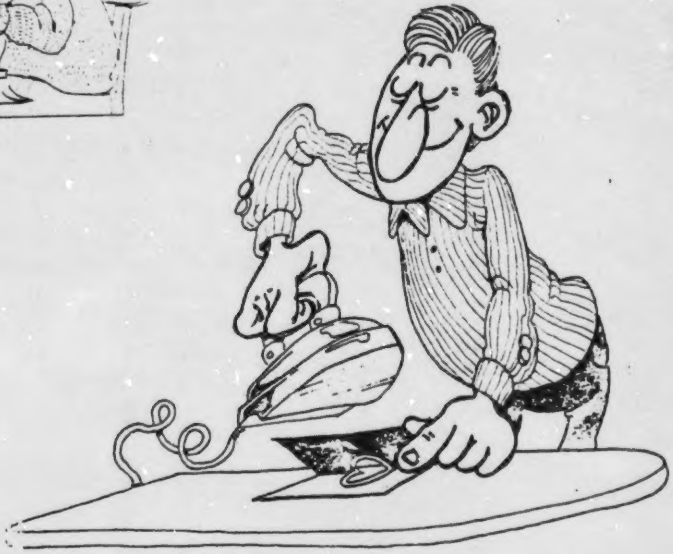
DO: * back up each important diskette before using it
respect the physical and magnetic integrity of it
label the diskette promptly
(either before affixing to the disk or use felt tip marker)
select a labeling system easy to both use and remember
maintain the proper environment
provide a static mat
(sometimes static spray and/or humidifier is also necessary)

DON'T: touch the exposed surface of a disk or diskette
fold or compress it
place near magnetic coils or magnetized objects
turn a system on or off while the diskette is in place
write on the label on a diskette with any sharp instrument
let diskettes lie around
expose to temperature extremes, dust, liquids, vapors
or electromagnetic interference

* 'Back up' is a procedure whereby an extra copy (or duplicate) is made of a software program, data contained in files, or entire systems to avoid loss of data in the event of power failure, ruined disks, sabatoged systems, or natural disasters.

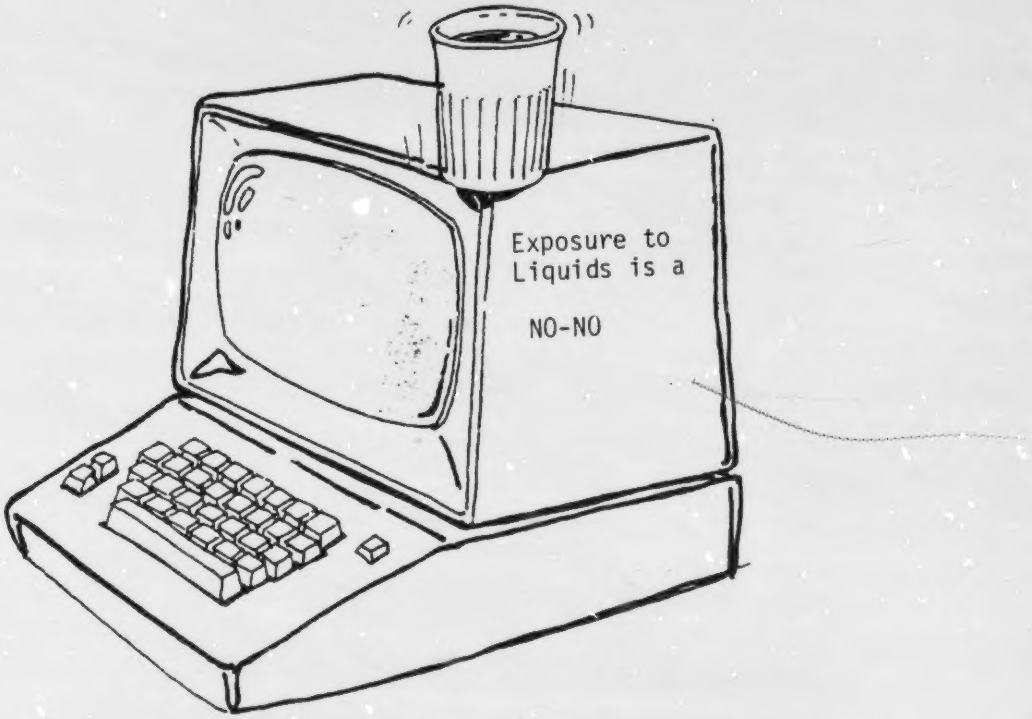


NO-NO



NO-NO

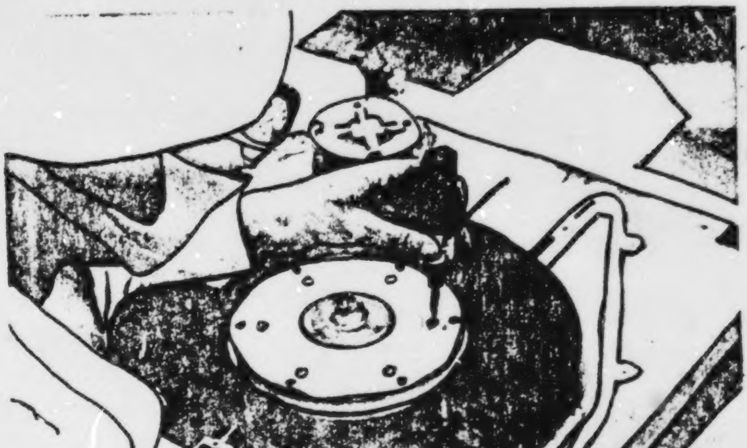
Hard disks are even more sensitive to temperature and smoke particles than the floppy disks. So the do's and don'ts are even more necessary to remember when using hard disks. The risk from liquids is even more prevalent since the hard disk is often part of the terminal itself; and terminal operators may be tempted to smoke and/or drink coffee, tea, etc. while operating the terminal. Besides destroying the memory storage and/or making the data inaccessible, such spills would also 'short-out' or ruin the boards which actually allow the computer to run. Then integrated circuits (chips) or entire boards (such as communications, word processors, data processors, or special application boards) would have to be replaced. Since an ounce of prevention is worth a pound of cure, it's a good idea to be sure that disks and terminals are used and stored in a controlled environment with proper temperature, no smoking, separate areas for eating and drinking, phones located far enough away so that they don't electromagnetically affect the data and/or equipment, as well as free from fumes and vapors.



Screens on terminals should be kept clean, but care should be taken when cleaning them. Cloth should be lint-free; if anti-glare screens exist, only use mild soap and water to clean them. However, don't let any liquid drip through the keys of the keyboard into the electronic circuitry below them. Just blow dust away (or use pressurized cans of inert gas which can be purchased from computer supply houses) or dust the keys off with a lint-free cloth moist enough to clean the keys but not moist enough to drip any liquid between them.

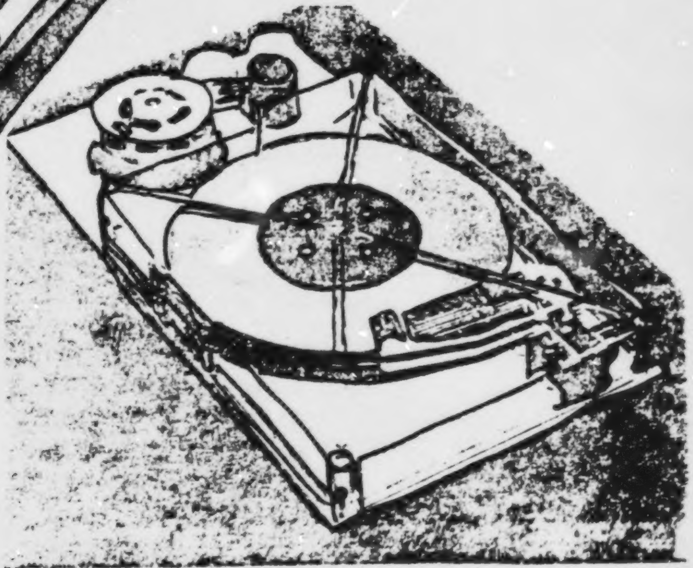
Be sure terminals are in a well lighted area with a minimum of glare and good lighting. Control knobs on the terminal also allow the brightness and density to be adjusted by the operator; some terminals even have a sensor so that once the operator has adjusted the brightness to suit them, the terminal automatically adjusts the density so that the indicated brightness is maintained when the room gets either lighter (with more sunlight) or darker (when sunlight is less or lamp burns out or shadows cover the light sensor). Some terminals highlight the data being worked upon instead of showing a cursor; brightness and density need to be adjusted for maximum usage of the highlighting capability.

The hard disk drives used for storage may be of a Winchester type or a storage area on a central processing unit (CPU). ROM is the Read Only Memory located in the CPU which contains the programs which generate the system and often programs which allow languages to be used to write or change other programs. ROM software does not allow the user to write anything on it; it is truly Read Only. RAM is the Random Access Memory which can contain programs and/or data which will be used. RAM software on hard disks can be erased or changed.



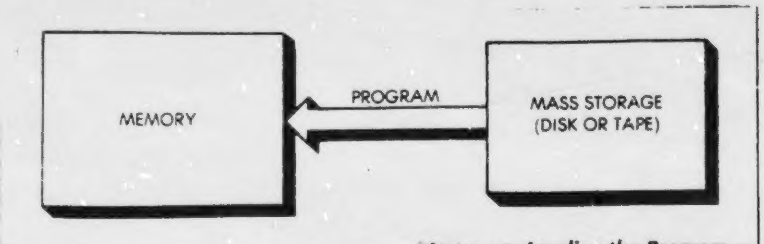
A Winchester Disk Drive

Being Assembled in a Clean Environment

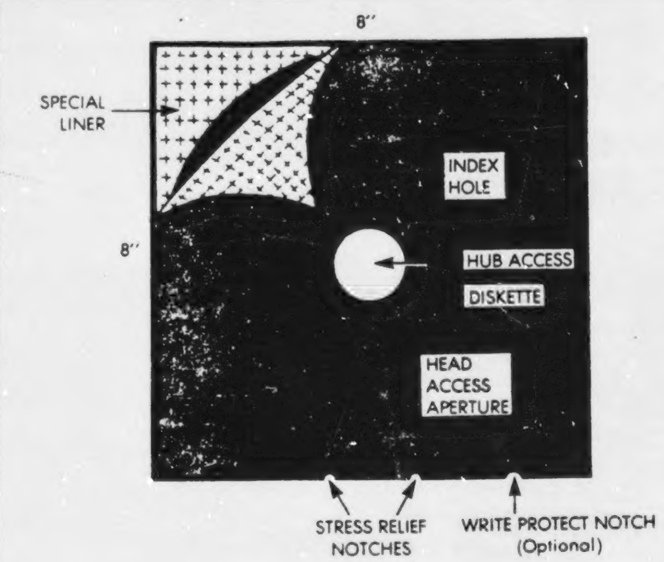


A Hard Disk Unit

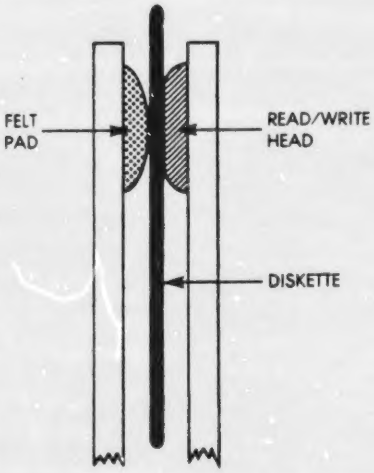
Random access takes much less time than serial access; since random implies that the command goes right to the desired location and retrieves the data for the user; serial implies that the command causes a search to be made of each record in sequence until the desired record is located. Besides the storage located within the Central Processing Unit, additional storage can be obtained by using floppy disks (as indicated previously) or by using hard disks. The Winchester disk can hold 5 to 10 meg (meg=megabyte = million bytes) of storage; several Winchesters can be connected to the terminal to provide mass amounts of storage.


MEMORY
PROGRAM
MASS STORAGE
(DISK OR TAPE)

Loading the Program


8″
8″
SPECIAL LINER
INDEX HOLE
HUB ACCESS
DISKETTE
HEAD ACCESS APERTURE
STRESS RELIEF NOTCHES
WRITE PROTECT NOTCH (Optional)

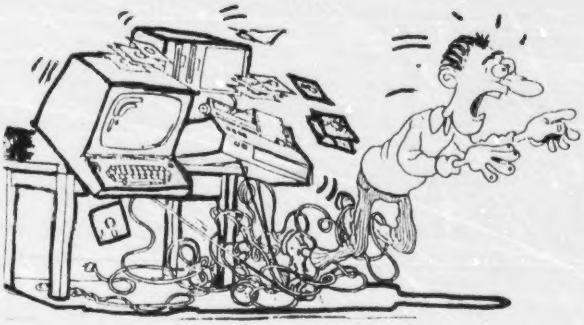
Details of a Diskette


FELT PAD
READ/WRITE HEAD
DISKETTE

Read/Write Mechanism

Besides the care which needs to be taken with the terminal and its storage media, power sources must be considered. We've already learned that systems should not be located too near such equipment as telephone sets, copiers and refrigerators. The actual electrical outlet also needs attention. It should not be shared with such devices as electric coffee pots or any of the above mentioned devices. The power fluctuation which occurs when such devices are turned on or when they run could cause a brownout (which is a slowing down of the response time, or causing a program to take a long time to execute, or even causing interruption of transmission and/or garbled data). Power surge adaptors are available for microcomputers; but they are not always the whole solution. Uninterruptible power sources are available for larger computers, but they are usually very expensive and it's not always possible to cost-justify such a purchase. The UPS is a backup power source which automatically switches to generators (usually giant battery cells) to run the computer until the electrical power is restored, or for a specified period of time after power failure, which enables the programs which are in the process of running to come to an orderly completion so that data will not be lost or garbled due to the power failure.

When adding peripherals, be sure wiring is adequate. Avoid this situation:



A summary of the guidelines for proper storage conditions is found below:

STORAGE SUMMARY			
ITEM	TEMPERATURE °C	TEMPERATURE °F	RELATIVE HUMIDITY (%)
FLOPPY DISK	4 to 43	39 to 109	8 to 80
HARD DISK	10 to 50	50 to 122	8 to 80
MAGNETIC TAPE	15 to 50	59 to 122	20 to 80
PRINTER PAPER	10 to 43	50 to 109	30 to 65
ALLOW 24 HOURS TO EQUALIZE			

Environmental Requirements for Storage —

So microcomputers, word processors and larger computers should not be plugged into a shared circuit (or at least not an overloaded one).

Extension cords are not recommended; it would be better to use an extension cord to plug in offensive devices as far away from the terminal as possible. And, before buying a device to smooth out the flow of electricity (power surge adaptors, 'spike' prevention), identify the source of a power problem. Then money won't be wasted remedying the wrong symptom with the wrong device. Also examine the backup procedures and data capture in order to determine whether an uninterruptible power source is even necessary or cost-effective. It may be wiser to have procedures in place to avoid loss of data (such as not using the terminal during a severe electrical storm); storing data more often on permanent storage during milder storms or when electrical problems are occurring; making sure that such data is backed up periodically throughout a day when power is fluctuating. Such precautions take a little more time, but probably not as much time as procuring new software, or re-keying entire data bases if backups have not previously been made.

ANSWER	QUESTIONS
A	Since minicomputers and distributed processing are becoming more widely accepted, computer languages have necessarily become more user-friendly. This means A. the commands are more English-like and it is less necessary to use commands which more closely resemble the numeric machine language. B. terminals are programmed to display messages, such as "hello, how are you?'. C. error messages displayed by the programs will never anger you. D. all of the above E. none of the above
D	Hard disk drives may be a variety of types, including A. Winchester B. Disk Cartridge C. Disk Pack D. All of the above E. None of the above
D	RAM and ROM are not synonymous, even though both are usually accessed randomly. A. Read-Only-Memory (ROM) is located in the CPU and contains the programs which run the computer and allows program languages to be used. B. RAM can contain programs and data. C. Random access takes less time than serial access. D. All of the above. E. None of the above.
A	Word processors and microcomputers can use which of the following storage media: A. RAM, ROM, Floppy, Winchester, Disk Cartridge/Pack B. Only magnetic tape C. Only video display D. All of the above E. None of the above
E	Diskettes have many do's and don'ts associated with them, among which are: A. Don't back up diskettes before using them. B. Don't use static mats, sprays or humidifiers C. Do leave diskettes in the disk drive until turned off D. All of the above E. None of the above

VIII. MANAGEMENT INFORMATION SYSTEMS, CANNED PROGRAMS, SYSTEMS ANALYSIS

There are do's and don'ts which apply to Management Information Systems in general, as well as to the equipment used to collect and disseminate such information. Among them are the following:

1. Don't pioneer. If a 'canned' program is available, USE IT. Careful reading of Western history indicates that statistically the pioneer lost his scalp more frequently than the settlers following him. So, if you get the pioneering spirit, check the statistics on who loses his scalp.
2. If your manual system is not working, don't try to go up on a computer. It will only compound your problems.
3. If you don't have the full backing and support of the Executive and Board, you won't survive.
4. Feedback is essential. Upload the information that will be most beneficial to staff first so that it can be fed back to them.
5. Simplify rather than sophisticate. K.I.S.S. (Keep It Sweet and Simple).
6. Don't put other demands on your staff when trying to put up the system.
7. Always assume hardware and software will be LATE - LATE - LATE - LATE - LATE!.
8. Never assume that the programmer knows more about your finances and management than you do. He should do no more than write the programs and run the hardware.
9. Train clerks and secretaries first and involve them from day one. A stable support staff, and we mean down to the last clerk, are the heart of the agency.
10. Be prepared during the implementation stage to work seven days a week, fourteen hours a day to get the system running. Our experience is that the staff are more than willing to make this kind of commitment if they understand how the system will work for them.
11. In a parallel, you will always assume that your tried and trusted manual system is correct and the computer has erred. It takes experience to learn that the manual system has its errors too.
12. Don't expect any help from your peers or funding agencies. They are more likely to be placing bets on your losing your scalp than succeeding.

A dozen more questions arise when trying to decide whether to purchase canned software or have applications programs developed. The following questions may be helpful in such decisionmaking:

1. Will the canned software do what you need?
2. Can it work on existing equipment?
3. Can it work with other existing software packages?
4. What extras can it perform besides the outlined requirements?
5. What does it take to run it?
6. How difficult is it to upgrade or change?
7. What changes are required to make it run in the current environment?
8. How easy is the package to use?
9. What documentation comes with the package?
10. What is the vendor going to do for you?
11. What is the history of the package?
12. Determine the cost.

In addition to the above, it's important to decide whether or not manuals are readable, whether or not they are sufficient for your uses, and whether or not additional training and/or formal education are necessary. If additional education/training is necessary, it's then wise to determine if self-teaching aids are sufficient or if high school or college courses are necessary. If the microcomputer is going to become your career, and you plan to perform your own application programming instead of using canned software, it may be necessary to take programming classes and perhaps computer science courses. If you intend to use a terminal with canned packages, the training provided with the terminal and/or the software package is probably sufficient. It's necessary to keep in mind that the state-of-the-art in the computer industry is to K.I.S.S. (Keep It Simple and Sweet) and make the terminals and software user-friendly. That way, the software manufacturers and system development departments of large computer complexes can employ the hard-core computer experts. Actual users can apply their energies to the data and the systems which they are attempting to computerize instead of applying those energies to the computerization itself. Knowledge of computers and computer systems will be helpful; however, high technology and computer experts may not be required for the simple operation of terminals on host systems, or using canned packages.

The reason you're even interested in using a computer is also important. Do you rely on others or make decisions yourself? If you are the decision maker, you would probably benefit from the information the computer can give you regarding past occurrences and the probabilities of future occurrences. Forecasting using prior trends is probably more reliable than forecasting from 'gut' instincts. If you're relying on others to make decisions, it is probably wise to have computer generated information, or tallies of past transactions and occurrences against which to weigh and compare decisions. Unless you can trust a person explicitly, it is probably wise to know the source of the information upon which decisions were based, and to be able to test the validity of such information.

There are many aspects to information management. Besides the decision makers who decide what data is to be gathered, and in what format, and how disseminated, there are other performers. Somebody has to be on the 'front lines' and actually gather the raw data and capture it on a source document. Decisions need to have been made ahead of time regarding how this should be done and what should be done with the captured data.

If your chosen role is the recipient of the management information, you may not be required to become 'expert' in any of the computer fields. However, it behooves information recipients to have an overview or general idea about the data, its source, the processes through which it passes, other processes effected by the data, any interfaces involving the data, any other recipients of the data, and finally - the use to which the data is to be put. If it is ever discovered that data is not being used by anyone, if it is never used or requested, it should probably be discontinued. Then, if someone was using it and nobody else was aware of that fact, 'someone' will probably speak out and complain because the data is being missed. If nobody ever misses it, in all likelihood it was no longer needed. Such data generation should be discontinued; data shouldn't be used as a security blanket or as job security.

The role of system analysts looks at overall operations as they presently exist and give advice regarding improvements to be made. In some cases, the existing manual system can be enhanced and still remain manual. Other cases require the computerization of a manual system. Still other cases require that existing computer systems be further enhanced by avoiding redundancy or making steps more efficient. System analysts usually take several computer science courses to obtain a data processing degree and to truly understand the consequences of their recommendations.

During system analysis, decisions need to be made regarding the format of the data. It can be gathered in narrative form, with other text containing the pertinent data. Then the necessary data needs to be circled, or coded onto another form in the blanks provided. Both input and output can be in the format of a narrative, columns of data or numbers, a matrix (where totals of elements are filled in which satisfy the criteria described across the rows and down the columns), a ratio, percentage, or even in graph form.

Once a system analyst recommends the design of a system, a programmer becomes involved if the system is to be developed for a host or mainframe computer (of if applications software is to be used instead of canned software on a microcomputer). A programmer may use any one of several computer languages: Assembler, BASIC, COBOL, FOCUS, Fortran, Pascal, PL/1, RPG-II and others. Flowcharts are used to determine where decisions are needed, and what logic is required (depending upon the answer to the decision question). Then coding is performed to make up the routines and subroutines which comprise the program. Some computer programs are simple and others very complex. Some run independently of other programs, and others interface (some even depend upon other programs in order to run at all). Computer programming language courses, systems analysis, and other computer science courses (such as JCL or Job Control Language, and computer operations, for example) are necessary in order to become a programmer.

After the programs are written, the master file is designed; characters, fields, records, and files are defined. Then the data is collected on an input document by the 'front line' worker. In order to get such data into the computer, the next step is data entry. In some cases the 'front line' workers will enter the data. In others, the document will be sent to a data entry operator at another location. Usually, the only training required for such an operator is the 'hands-on' training for the terminal to be used, instruction manuals for the software to be used (provided by the system development programmer or software house usually), and familiarization with all possible codes accepted by the system so that judgment can be exercised when data is questionable or obviously wrong. If the data entry operator is not authorized to change the data, such training is at least valuable in providing the operator with enough background information to ask intelligent questions and perhaps avoid obvious errors which would be caused by not screening the data.

Once the format of both the input and output is decided upon, the determination must be made regarding the type of terminals, storage media, printers (also plotters, computer-output-microfiche producers, and any other output devices).

When a user knows what is necessary, and determines what equipment will provide those necessities, another decision is needed. What is affordable? Many of today's word processors and microcomputers are capable of processing both text and data. If the application is comprised of mostly text, probably a word processor with data processing features is acceptable. If the application is mostly files and data collection with some text (a few form letters, a few brief narratives about each record), then a microcomputer with canned software for word processing is probably a better choice. Prices of each should be researched; then the prices should be compared with what it would cost in resources to force either piece of equipment to perform dual functions. If too much efficiency is lost, probably economies should be made in some area other than the purchase of terminals.

Most microcomputer systems are modular and made to expand and upgrade both the hardware and software. Many microcomputers and word processors attempt to be IBM-compatible by emulating or looking like IBM terminals so they can communicate with host or mainframe computers when volume or complexity requires additional computing power or storage.

Application (Or Need) Exists 1

Enhancements Are Necessary 2

New Needs Arise 3

System Analyst Studies System 4

Recommends Solutions 5

Canned Software OR Application Software 6

If no suitable software program is available, you can:
1. lower requirements so canned package can fulfill them;
2. purchase package than can be modified;
3. contract for customized software development;
4. develop software in-house.

Solution A:

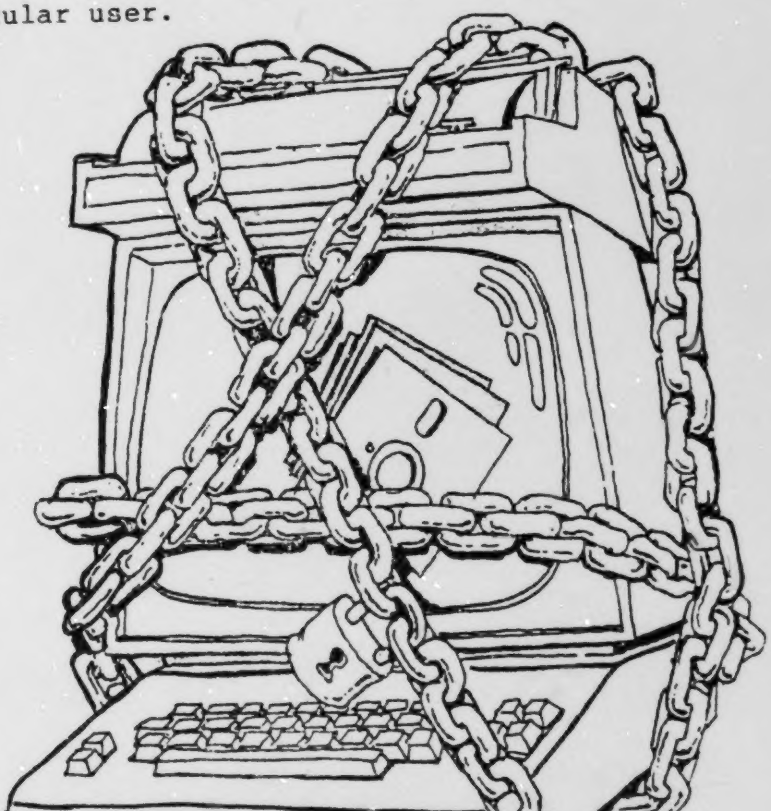
1. Software Package Is Chosen
2. Configuration Is Determined
3. Cost/Benefit Is Demonstrated
4. Hardware Is Chosen & Purchased
5. Hardware & Software Are Tested
6. Hardware & Software Are Implemented
7. User Runs System & Uses Data

Solution B:

1. Recommendations are given to Programmer
2. Flowcharts & Decisions Are Outlined
3. Programming Language Is Chosen & Coding Performed
4. Programs Are Tested & Debugged
5. Documentation/Manuals Are Prepared
6. System Implemented On Host Using Terminals
7. User I.D./Passwords Assigned
8. User Enters & Uses Data
9. Programmer Maintains System At User's Request (Or Emergency)

Limitations exist which sometimes require trading or selling old equipment in order to get compatible equipment. The communications features are important (synchronous, asynchronous, bisynchronous) as well as protocol types (3270 emulators, ASCII instead of EBCDIC). Dial-up lines and usage must be compared to dedicated lines and direct communications lines. If terminals are hard-wired to the host or mainframe, the host recognizes the address of the terminal and awaits communications; as soon as the terminal is powered on, the host sends a message for the operator's identification and password. Some microcomputers must dial up the host. That can be done with an acoustical coupler and phone set as previously described; or a hard drive can be programmed with the phone number of the host. Then when the program is accessed and executed, the computer actually 'dials' the host.

Such communication is often discouraged due to the additional security precautions required. When dial-up systems exist, access is easy if a person has the signon procedure, user identification, password, and telephone access number. 'Hacks' or users who wish to gain unauthorized access can often go through a series of attempts until they 'guess' the right numbers and gain such unauthorized access. If a direct line exists from the host to the microcomputer, the host computer usually employs safeguards (such as only allowing a limited number of attempts - such as three). Other safeguards include changing passwords (and even identifications) on a regular basis - monthly for example; assigning passwords to all levels of a system (the system itself, the files within it, the records and even fields within the files); allowing access to only the portions of the system needed by a particular user.



Even without communications, security precautions should be taken. Backups should be made in case 'hacks' or any others intentionally or inadvertently ruin data and/or programs. Naming conventions should be used when labelling diskettes and the documents or files contained in them; but the log of such names should be protected and passwords should be protected and respected. User identifications should be logged and maintained by a person in authority who can screen such use when necessary, remove access when a person leaves or is terminated, allow access to new users in a timely fashion; in other words who can control the access while allowing access in order to serve the users. The diagram on the previous page shows a need for security, but all that metal would surely raise havoc with a real terminal.

Terminals vary in the distance they can be located from the central processing unit. Some must be within 50 ft., 200 ft., 500 ft., 1000 ft., 5000 ft. and so on. Terminals also vary in the format of the data they can accept, often depending on the software. Some accept data in free form (text and word processing, or narrative with word search); others require a specified number of blanks to be shown on the screen - then the operator fills in the blanks; when such blanks have labels or identifiers associated with them, it's called prompting. The operator need not necessarily follow the form as it is - the prompting tells where to look on the form for the desired information. Prompting takes up more space, but it often worth the space for the time it saves the operator. When labels take up too much space, it may be desirable to give a number to each blank to be filled in; then the items are numbered on the source document or form, and the operator can key in the numbered data item from the form to the corresponding numbered blank on the screen.

Before such data can even be keyed in, it is necessary to turn on the terminal. The microcomputers and/or word processors must be plugged into the electrical outlet. (If communications features exist, the terminals are always plugged in, the phone line is always connected and turned on, and usually the terminal itself in always left on - so that when the computer gets ready for the day's processing and looks for the addresses of each and every device, the terminal is on and in the 'ready' mode). Otherwise, a computer operator must 'vary on' any terminal the computer tried to recognize but couldn't because the power was not on.

The power switch must be turned on; then when the screen shows that it is ready (usually by a message on the screen, or an audible sound such as a beep), the user inserts a program diskette or keys in the name of the procedure desired if a hard disk is being used. The program-diskette has the software necessary to allow the computer to perform word processing, recognize computer languages, translate programs to machine language, to understand the software diskettes and data disks to be used, and to communicate with other terminals, peripherals, or a host. Program diskettes are provided for each terminal (even if they have to be purchased separately), and must be present either in a disk drive or hard disk before the computer terminal can be operational. Such disks are usually Read Only Memory (ROM) to prevent inadvertent erasures or alterations by a novice user, and also to prevent intentional alteration or copying by an unauthorized expert.

Once the system programs are loaded, the terminal will require a user identification and password (if they have been assigned) or will be ready for access. Then the user must identify the names of files, canned software, or an area of a diskette for creating new programs. Other software can then be loaded using diskettes or accessing program names on a hard disk; then the data can be entered or stored on still more diskettes or spaces on a hard disk.

In the cases where terminals are being used to go through the tutorials for canned software, once the software is identified, messages on the screen prompt the user as to which key(s) to strike to perform the lessons or skip the entry and just read through the entire lesson.

In cases where the user is accessing canned programs, 'help' keys can usually be pressed in order to get a message regarding the next step to be taken, or to get an error message to guide the user out of the program to start again, or simply to get from one routine to another. Canned programs also usually have prompts for filling in the blanks or desk/reference manuals to guide the user through the steps of creating their own file(s).

Writing one's own program usually requires a language (such as BASIC) or a prompted package (such as dBASE-II). Then the instruction manuals are followed in order to achieve the desired results. BASIC can be either simple or complex; if a great deal of complexity is desired, a BASIC class may be required in addition to using the instruction manuals.

There are several software packages for creating data base management systems and data banks. A computerized data bank offers these advantages:

1. data can be accessed from a large number of points; but is stored centrally.
2. information can be updated readily in one place without having to send corrections or changes notices to all potential users.
3. information retrieval is rapid and accurate.
4. management information is provided regarding the numbers and types of access or requests against the data bank.

Terminals which access the data banks can also be used by statisticians and recipients of data; even if they have not been involved in the collection of the data. Report retrieval languages (such as MARK-IV, FOCUS, SPSS) can be used against any and all files once the files have been defined by a programmer. Then requests can be written in near-English-language, using some predefined verbs and adjectives to make up the sentences of the request. This saves time and also saves money since the users need not pay for system development programming to create the reports; users can create the reports themselves.

Electronic mail allows a central processor to disseminate data to selected or all other terminals on a network. The 'mail' can be viewed on a screen or printed. If high volumes of data are to be transmitted, some precautions need to be taken to ensure that adequate buffer space is available as well as a multiplexor to compensate for the difference between the cycle speeds of the Central Processing Unit and the terminal(s) or printer(s).

ANSWERS	QUESTIONS
E.	If no suitable software program is available, you can: A. lower requirements so canned software will suffice; B. purchase a modifiable package; C. contract for customized software development; D. develop software inhouse; E. all of the above.
D.	Security is important; some measures which can be taken are: A. allow a limited number of attempts to enter identity; B. change passwords and identity on a regular basis; C. assign passwords to only upper levels of a system; D. only A & B; E. only B & C.
B.	As soon as the terminal is turned on, it: A. beeps, buzzes, and starts doing an application program; B. beeps or displays message to load the program disk; C. speaks to the user in an audible voice; D. all of the above. E. none of the above.
D.	Help keys and tutorials are used to: A. prompt the user to the next step to be taken; B. learn the program, go through it step by step; C. guide user through steps of creating files; D. all of the above. E. none of the above
D.	Data banks offer these advantages: A. data can only be accessed from a central site; B. data is stored and accessed from a central site; C. information retrieval may not be accurate; D. management information is available regarding the numbers and types of requests against the data bank. E. change notices to potential users are still necessary.
A.	Electronic mail allows a processor to disseminate data to selected or all terminals on a network. It also A. allows messages to be printed on a screen or printer; B. requires a buffer and/or multiplexor to compensate for the differences in speed between sender & mailman ; C. requires coordination with the U.S. Postal Service; D. only A&B are correct; E. none of the above are correct.

CONCLUSION

The preceding questions conclude the body of this primer. Hopefully, you are comfortable with computer concepts, computer terminals, and computer terminology.

Since it was never intended that this primer guide you through a step by step operation of a terminal, the next step should be for you to attend a hands-on workshop or training session in the actual operation of microcomputers and/or word processing terminals.

I sincerely hope this primer has been helpful, and that future computer related activities will be easier for you because of it.

Sincerely,

Judith H. Penny

Judith H. Penny

APPENDIX A - GLOSSARY

Access	pertains to the ability to transfer information into or out of a storage location. Immediate access means that the transfer is done without delay. Multiple access means that such transfer occurs at more than one geographic location or with more than one device. Random access refers to a storage device from which data can be retrieved by going to a particular address or location on the device instead of having to look at each record sequentially until the desired one is encountered. Conversely, serial access refers to the storage device which reads each record until the desired one is located.
Acoustic	acoustic couplers are mechanical devices that allow a telephone handset to be connected to a modem; in some instances the term refers to the entire modem.
Acronym	is a word formed from the initial letter, letters, or syllables taken from a succession or group of words, and capable of being articulated. Examples are COBOL, BASIC and lots of computer related words.
Address	is an identification, such as a name, label or tag, represented by a number or another set of symbols, that specifies a location in storage, other data source, or destination. Programmers often find their problem by locating the 'address' at which a program stopped or malfunctioned. Also see memory, location.
ADP	is an acronym for Automatic Data Processing.
Algorithm	is a term found in accounting and other environments as well as computer fields; It is a statement of the steps to be followed in the solution of a problem.
Allocate	is to assign, allot, commit, or reserve specific parts of a data processing system for a specified purpose. For example, to assign 3 programmers to DHSS from 8:00 AM to noon is an allocation of resources.
Alphanumeric	is a contraction of alphabetic-numeric and is a set of characters including letters, numerals, and usually a set of additional special symbols used as punctuation marks, special meaning marks, etc. (!@#$%¢&*()_+=?:;').
ALTER	is an acronym for Automated Legal Text Entry and Revision. Up until 1983, ALTER was the only recommended

word processing language that Wyoming Data Services would support. The ALF, or ALTER Language Facility was the subsystem which provided terminal operators with a means to write application programs tailored to individual text needs. Now Data Services allows the CPT word processing to be purchased without a special request; other word processors and word processing packages may be requested and are evaluated on an individual request basis.

Analysis	is the resolution or separation of any whole into its component parts to discover or investigate their nature, behavior, proportion, function, relationship, etc. System analysis is the overall and thorough analysis of an activity, procedure, method, technique, or business to arrive at the most appropriate way of accomplishing what needs to be done. The result of such analysis is a specification of the steps that should be taken, in proper order, so that a specific objective is achieved or a procedure is optimized. Such tasks are performed by a systems analyst.
Application	is the broad area of work under consideration such as budgeting, payroll, personnel management, airlines reservations, inventory control. Application pertains to the type of task to be performed. Computer application means that the task will be performed by using data processing, and application program refers to a program which was written to meet a specific need.
ASCII	is an acronym for American Standard Code for Information Interchange; and is a standard code that assigns specified bit patterns to each sign, symbol, numeral, letter and operation in a specified set. Most microcomputers are ASCII; however, as communication with larger computers and mainframes becomes desirable, many micros are now capable of bisynchronous communication as well as ASCII.
Assembly	Assembly language is a means of communicating with a computer at a low level. Since Assembly language is less English-like than BASIC or COBOL but more English-like than the 1's and 0's that the computer understands, it is often used by technical programmers to make efficient use of memory space and to create a program that runs quickly. For today's user-friendly software, however, Assembly language would not be used.
Asynchronous	is a mode of operation such that the execution of the next instruction or the next event is initiated by a signal that is generated upon completion of the previous command or event. However, instead of transmission speed depending upon these fixed commands, most systems depend upon a clock pulse or timing signal and are called synchronous.

Audit	refers to an operation or check designed to ascertain the validity of data. In data processing, the audit may be performed at any point. The validity of data is verified through the use of hash totals, check sums, maximas, minimas, redundancies, inversions, cross-totaling, and various other methods.
Automatic	An automatic typewriter is one which records information onto a medium for later playback of recorded words, produces copies at high speed which look like each one was individually typed. The same is true of those typewriters described as "Electronic" or "Memory" typewriters.
Automation	is an entire field of investigation devoted to the design, development, and application of methods and techniques for rendering a process or group of machines self-actuating, self-moving, or self-controlling. Automation pertains to the theory, art or technique of making a machine, process or device more fully automatic.
Auxiliary	To provide help by means of outside or additional equipment. See also auxiliary Operation.
Backup	an extra copy of software, normally kept on file in case an original program is damaged or lost; also refers to an extra copy of data and/or files.
Bank	A data bank is a comprehensive collection of data; for example, several automated files, a library, or a set of loaded disks.
BASIC	refers to Beginner's All-purpose Symbolic Instruction Code. It is the most used high-level language for small computers; it permits entry, access, and manipulation of data.
Baud	a measure of the amount of information transmitted in a given amount of time, usually bits per second.
Binary Digit	a system of numbers having two as the radix (one and zero are the only combinations). Computers are binary machines that operate according to the combinations and arrangements of the bits (ones and zeroes) contained in the system software. Also see 'number'.
Bit	is the binary digit (1 or 0) which the computer understands.
Blank	is a part, area, or section of a data medium in which data is not entered or recorded.
Boilerplate	refers to stored paragraphs that may be combined to create a new document, or serve as the base document to which other stored paragraphs may be added.

Boot	the initializing of the computer system by copying the operating program from the diskette (or hard disk) into the internal memory. If a terminal locks up or goes down due to a power failure, or if it is the time of day to reset all programs in the computer for a fresh start, the system is booted or initialized.
Break	has at least two meanings in data processing. Break means an interruption of transmission (and most computer keyboards have a 'Break Key' that tells the computer to stop what it's doing and wait for further instructions. In software, break can mean to stop at the end of one page and begin another (page-break); or break can identify the points at which a program should compute summary totals. For example, logic may require a break at state, county, local in order to show different levels of activity or dollar amounts at each break.
Buffer	is a storage device used to compensate for the difference between the rate of data flow from a transmitting device and the rate of data flow that a receiving device can receive. A section of internal storage of a computer reserved for receiving or storing either input or output data or instructions (or both).
Bug	is a mechanical, electrical, electronic, or logical defect in a piece of equipment or in its operation, or a defect/error in a coded program. A malfunction or mistake.
Byte	is a sequence of bits that represent a single character. In most small computers, there are eight (8) bits to the byte. Storage is often described in 'K' which is kilobyte and represents a thousand bytes, and in meg, which represents a megabyte or million bytes of storage.
Calculation	is the determination of a result, by addition, subtraction, multiplication, and division. These arithmetic operations may be considered fundamental to all other calculations, such as evaluating square roots and other mathematical functions.
Camera-Ready	is a term indicating that a page (or document) is ready to be photographed for reproduction. This may refer to multiple copies to be produced on one's own ink-jet or laser printer; or this can mean that a page or document is ready to be sent to a printing establishment.
Capacity	refers to the quantity of data a device can hold or store. For example, the number of digits, words, or bits a storage unit or a register can hold. A floppy diskette can hold about 150 pages of words. A

	Winchester hard disk can hold approximately 5 million bytes (5 megabytes) of data. Microcomputers can hold data on internal memory without floppy disks ranging from 64K (over 65,000 bytes) to 96K to 128K and so forth. It is important to attempt to determine present and future required capacity before purchasing either hardware or software.
Catalog	is a list of item labels and descriptive data arranged in accordance with a rule of order to permit such location. Catalog may also be referred to as index, directory, or table of contents on various computers.
Character	refers to an elementary mark or event used in combination with others to represent data. A character often occurs in the form of a graphic or spatial arrangement of connected or adjacent strokes (thus words are characters and they are separated by non-characters called blanks; numbers take on meaning when they occupy certain places designated by the program as right-justified or left-justified and zero filled or not).
Chip	generic term for integrated circuit; refers to slices or chips of silicon (of which they are composed).
Close	In data processing, to finish (at least temporarily) any processing associated with a particular file. Some computers do not update a file until it is closed.
COBOL	is an acronym for Common Business Oriented Language and is a business data processing language developed by a committee sponsored by the U.S. Department of Defense.
Code	is the set of rules used to convert data from one form of representation to another.
Column	is a line of vertical elements in a rectangular matrix of elements.
Command	is loosely termed as a control signal, an instruction for a computer in machine language, an operation to be performed by a computer, or an operator itself.
Compatibility	refers to one unit's ability to function in conjunction with another unit. This term is important in both the word processing and data processing environment. Compatibility becomes very important when referring to hardware since it implies that old equipment won't have to be replaced when trying to make it work with new equipment. When referring to software, compatibility is always an important consideration. If a user knows that sometime in the future different equipment may be required, a decision should be made regarding whether or not software programs should be developed only for the present hardware; or whether canned software of a

	"generic" variety should be used. Since technology currently changes almost daily, it's usually a wise choice to use software which is flexible and compatible with at least the "industry" standards such as IBM hardware, and BASIC software.
Compiler	To write a computer program to accomplish the solution to a particular problem, a language is chosen; the program is written, then input to the computer and passed through a compiler which translates the instructions into machine language. Any errors, any data unacceptable to the computer or the language being used, are printed out with error messages to be rewritten and tried again. The program will not run until it has passed the compiler without critical errors (simple errors may still get by, but results should be carefully examined if the simple errors were not corrected).
Computer	is a device capable of solving problems by accepting data, performing prescribed operations on the data, and supplying the results of the operations. for computer operator, see 'operation'.
Configuration	refers to the specific set of equipment connected together to form a single computing system for a given application.
Console	is the part of a system, such as a computer, process, controller, or operations controller that is used for communication between the operators or service personnel and the system.
Constant	is a quantity or data (or data representation) that does not vary in value.
Constraint	is an imposed or natural limit, bound, or condition within which the solution of a problem must be obtained. For example, management policy, economic condition, geographical limit, word length, or room size.
Conversion	of Data refers to the changing of data from one form or representation to another, or from one physical recording medium to another. For example, data keyed from source documents to a computer file; also converting IBM System 34 diskettes to hard disks used by the host computer.
CP/M	Control Program for Microprocessors. One of the oldest and most popular operating systems for microcomputers.
CPU	is the Central Processing Unit and refers to the heart of the computer where the instructions are received and acted upon.

CRT	is the Cathode Ray Tube which is also known as the 'screen', VDT or Video Display Tube, 'terminal' and other pet names.
Cursor	a position indicator on a CRT; normally a flashing or non-flashing square or rectangle (can also be an underscore or may highlight the character).
Daisy wheel	see 'printer'.
Data	A representation, such as characters, to which meaning might be assigned; for example a representation of information expressed in the form of conventional signs and symbols.
	Raw data is that which has not been machine processed or which has not yet been reduced.
	Source data is that data created by a generator or originator of data, usually an individual; an organization of data transmission equipment that supplies data.
	Test data is that which is specifically developed to establish the adequacy and accuracy of a computer run or a computer system.
	Data processing is any operation or combination of operations on data, usually in accordance with a specified or implied set of rules, as a series of discrete steps, including operations such as compute, assemble, compile, interpret, generate, translate, store, retrieve, transfer, select, extract, shift, search, sort, merge, read, write, print, erase, punch. The processing usually results in a solution to a problem.
	Batch data processing occurs when a number of similar input data items are grouped together and processed during a single machine run with the same program, for operating convenience and efficiency.
	Centralized data processing takes place at a single location, usually with a given configuration of equipment in one building. This term can, however, refer to centralization of responsibility and authority over processing which must, by necessity, take place in several separate locations.
	Decentralized data processing takes place within each subdivision of an organization or at each geographic location of the parts of the organization.
	Electronic data processing uses electronic equipment, such as an internally stored program, electronic, digital computer, or an automatic data processing machine.

	Online data processing occurs when all changes in appropriate records and accounts are made as each transaction or event occurs (individually instead of 'batched').
Data Base	The accumulation of related data pertaining to one or more designated applications usually organized in a manner which permits additions, retrievals, deletions, and adjustments to that data.
Debug	To remove a mistake, malfunction, or a fault.
Decision	A choice from among two or more possible courses of action. Thus, decisionmaking is the process of determining further action based on the relationship among the available choices.
	A logic decision is one made in a computing or data processing system as a direct result of the internal organization of the system, and usually confined to a yes or a no kind of decision.
Delete	To remove or eliminate; for example, to erase a record in a master file or to change a character from a known, but perhaps wrong character, to no character at all.
Delimiter	A flag, such as a character, which marks the bounds of a series or string of characters and therefore cannot be a member of the string unless it is the first or last member.
Design	Data design refers to the layout of computer storage, machine storage allocation, and input and output formats that are to be used in the solution of a problem or machine run.
	Functional design refers to the specification of the working relationships between all parts of a particular system, taking into account the equipment used and the logic design.
	Design logic is the specification, usually in symbolic form, or the working relations between the various parts of a system.
Device	An appliance, apparatus, mechanism, or contrivance that is created, formed, invented, devised, or constructed by design, such as a mechanical steering device or an input-output device.
	Storage device is one into which data may be inserted, in which it may be retained, and from which it may be retrieved.
Diagnostic	Pertains to the detection and isolation of a malfunction or mistake.

Diagram	A graphic or symbolic representation of the behavioral relationships in time and space, between the parts of a program or equipment - usually including a portrayal of specific events or causes and their results or effects. A block diagram of a system, such as an instrument or computer or program, in which certain portions are represented by annotated boxes and interconnecting lines. A flow diagram or flowchart symbolically represents the steps to be taken in a computer run or program and is very useful in determining branches of logic to be taken when yes or no answers to decisions are made.
Digit	a character used to represent one of the integers smaller than the radix of the number system involved. A binary digit is a character used to represent one of the integers smaller than radix two (the zero (0) and one (1) which the computer understands). See 'binary'. A decimal digit is a member of the set of 10 digits; for example, 0,1,2,3,4,5,6,7,8,9 used in a numerical notation system that has a radix of 10. Also see 'number'.
Directory	a list of items or entries with a corresponding related item for each entry in the list.
Disable	To remove or inhibit a normal capability. (In the example under the word 'break', hitting the break or escape key disables the terminal and prevents further transmission.)
Disc or Disk	Magnetic disks are flat circular plates with magnetic surfaces on which data can be stored by selective magnetization of portions of the flat surface; can be hard disks, floppy disks, or Winchester disks, disk cartridges, or disk packs.
Discrete	pertains to data consisting of separate and distinct parts, such as holes in a card, electrical pulses, or graphic characters.
Display	a visual record; for example, a form of computer output in which the data is intended to be read or visually scanned, and usually acted upon before some subsequent action is to take place (such as the display of the contents of a register for checking purposes), or a reply to a query made.
Document	A medium in which data has been stored, such as a printed form with data elements printed on it for machine or human reading or use.

	A source document is one that is originally entered into a data processing system and from which basic data is extracted for use in the data processing system.
Documentation	The process of collecting, organizing, storing, citing, indexing, retrieving, and disseminating documents or their contents. Documentation involves a group of techniques necessary for orderly presentation, organization and communication of recorded specialized information in order to give maximum accessibility and utility to the information contained in documents.
Drive	Tape drives and disk drives are mechanisms which move the media being used in order to read, record and write data to be stored; usually includes such items as capstans, drive motors, reel hubs and the read-record heads.
Dummy	Pertaining to the characteristic of having the appearance of a specified thing but not having the capacity to function as such (such as dummy instruction, address, data, name, etc.).
Dump	To copy the contents of all or part of a storage, usually from an internal storage to an external storage. (This dump is often in machine language and only readable by trained programmers.)
Duplex	The characteristic of being able to serve two purposes, such as the ability of a communications channel to transmit messages in both directions.
Dynamic	Pertaining to a quantity which is changing, usually by the application of power over time.
Edit	To modify the form or format of data. Editing usually involves the arrangement, deletion, selection, or addition to a record in order to conform to the style and conventions of later processes, such as input and output operations.
EDP	Electronic Data Processing (see also Automatic Data Processing).
Electronics	That branch of science which deals with the motion, emission, and behavior of currents, of free electrons and certain ions, especially in vacuum tubes, gas tubes, semiconductors, superconductors and microprocessor chips.
Element	A data element is the name of a set of data items; for example, a wage rate of an employee or job, a rate of payment to an eligible applicant for Food Stamps or AFDC.

Emulate	To imitate one system with another such that the imitating system accepts the same data and programs and achieves the same results as the imitated system. Many microprocessors claim to emulate the IBM Personal Computer. Users must check out these claims to be sure that their application can indeed be emulated without adverse effects.
Emulator	The hardware built into a computing system which makes the system appear and behave to certain software (such as programs and routines) as if it were another system.
Entity	Any item or thing that has individual existence in the mind or in reality.
Entry	A way or method of entrance into an item, a collection of items, or one of the items of the collection itself. See also the definition for data entry. Keyboard entry is the entry into a computing system by using a set of keys (such as the setup of keys for typewriters).
Environment	The elements or factors that influence or affect the design and operation of a device or system such as a computer, and to which it must adapt, adjust, readjust, and continue to exist and thrive. Computer Room environments include temperature, light, humidity, dust, and other similar factors.
Equipment	The hardware, (such as electronic computer systems, punched-card machines, devices, and components) that is used to provide a service. Peripheral equipment refers to specific devices associated with a data processing system; for example, magnetic tape units, printers, sorters, plotters, card readers, and punches. Usually peripheral equipment provides a means of communication between the computer and its environment.
Erase	To remove data from storage, leaving the remaining space in a blank condition, or containing no data at all.
Error	The deviation of a computed, observed, or measured quantity from the true, specified, or theoretically correct value of the quantity. Data errors are those introduced by the source data rather than by a mistake in the program or a malfunction of the computer.

	Machine errors are deviations from correctness of output data caused by a fault or failure in the hardware of a system. Program errors are mistakes in the program. Such a mistake can be introduced by a programmer, coder, key puncher, or a machine-language compiler or assembler, due to either a machine malfunction or a mistake in the compiler or assembler (or the logic used by the programmer). Rounding errors are errors in numerals caused by deleting the less significant digits of the numeral and applying some rule of correction to the part retained. For example, decimals can be rounded 'up' using 5 and above; or they can be rounded 'down' by truncating any number which includes a decimal to only the whole number. Truncation errors are those introduced by truncating an expression at some point; that is cutting off or removing the last several letters of a word or digits of a number.
Evaluation	Data evaluation is the examination and weighing of data in order to obtain an assessment of its inherent meaning; probably the accuracy, relevancy, and relationship to a given situation or context. Performance evaluation in data processing is the on-site analysis of accomplishments with a computer of automatic data processing systems in terms of initial objectives and estimates, to provide a base of experience, to identify corrective actions and to recommend procedures for performance improvement.
Execute	to carry out an instruction or series of instructions.
Expression	One or more symbols to which meaning is assigned. Sets of expressions form statements.
Extract	To remove, from a set of items, a subset whose members meet a specified criterion.
Extrapolate	To extend a curve beyond the limits of known points by continuing the trend established over known points.
Facsimile	A commercial method developed by AT&T for transmitting images, such as letters, pictures, maps, and diagrams by electrical means (usually over phone lines/wires).
Failure	Equipment failure is a fault in that causes improper behavior of the equipment or that prevents a scheduled job from being accomplished, such as the interruption of execution of a computer program.

Field	A specified part of the record. Characters create fields, fields create records, records create files. A control field is a particular location used for control in each of all of a set of items, records, or files of data. Control fields may be known as 'keys'.
File	A collection of related records. (Such as the AFDC file which contains records of AFDC clients; the Food Stamps file contains records of Food Stamps recipients, etc.). File name or type must be a predefined length (such as 8 characters); the name must be unique (or else one file with the same name would overlay another - even if they are not the same data). Then the computer locates the file you request by that name or type only. An active file is one currently in use. A chained file is arranged so that each data element item, or key in a record, has an address of another record with the same data element, item, or key. A dead file is retained, but not currently in use. An inactive file may also be called an archive file and means that the file was once active (although not in current use) but will almost certainly be restored to an active status. A master file is a main reference file containing data that is relatively permanent but that is usually updated periodically by a detail file, which contains relatively less permanent data. Master files are often known as small, individual data bases (in the absence of a true data base system).
Flag	An indicator, such as a signal, symbol, character, or digit, used for identification. Flags are often used to note occurrences which are not expected or to indicate information which has been added, places where decisions have been made, items which have been removed from active status (but are still present on the file).
Flow	A sequence of events, such as operations or decisions involved in the solution of a problem or the movement of data. Flow can be mapped, showing the interrelationships among the steps or events.
Flowcharts	A graphical representation for the definition analysis, or solution of a problem or situation in which symbols are used to represent operations, data, flow, or equipment. See also flow diagram.
FOCUS	A fourth generation language which is user friendly and intended to be used for information retrieval, report

	generation, and creation of moderate data bases within the Wyoming Data Services Division.
Font	A family, set, or particular assortment of consistent size, shape, or style of printer's type or characters, including alphabetic and numeric characters as well as other signs and symbols. Font type is a type face of a given size; for example, 10-pitch Gothic or 12-pitch Old English.
Form	A document that has blank spaces for the insertion of data, such as a blank check or an application for the services of one of DHSS' agencies. Pinfeed form is a continuous strip of single or multiple part paper that is fed, aligned, and positioned by means of pins or sprockets that fit in marginal holes and then used on writing or printing mechanisms. The forms may be pre-printed, ruled or subdivided.
Format	A specified or predetermined arrangement of data on a document. Users often specify how their files should look and refer to such placement as the format; however, programmers then refer to such format as the file layout. New diskettes need to be formatted; then the user knows whether or not the diskette can be read.
Fortran	Formula Translator: a formula translating language designed to instruct computers to solve algebraic problems by permitting mathematical language to be converted automatically to machine language.
Generate	To produce a computer coding or program automatically by means of a computer program generator. Random number generator is a device, such as a computer, either built-in control or under program control, capable of producing a random number or a series of random numbers or digits, according to specified limitations or criteria. Report generator is a computer routine designed to prepare a report or a display of data.
GIGO	An acronym that represents the expression Garbage In Garbage Out. The implication is that if meaningless, incoherent, inconsistent, wrong or otherwise nonsensical data (garbage) is inserted into a computing or information processing system, any operations performed on this data cannot improve it, but can only output 'processed' garbage.
Glossary	An ordered word list with a definition for each word in a given discipline. Report retrieval languages require

	a glossary which is a redefinition of the file from its original language into the report retrieval langauge; it shows the field, its length, its old name, its new name.
Graphic	Pertaining to the pictorial representation of material, usually legible to humans and applied to the printed or written form of data, such as mathematical curves, charts, histograms, pie charts and others.
Hard Copy	a printout of information produced by the computer (on paper, or microfiche or microfilm).
Hard Disk	as opposed to soft, floppy disks, the hard disk is enclosed (usually in hard plastic or metal) and sealed. It has the advantage of storing greater quantities of data than the floppy disk, and is usually read faster by the computer.
Hardware	Physical equipment such as the mechanical, magnetic, electronic, or electrical devices or components from which assemblies are made (or the assemblies themselves). Terminals, keyboards and printers are examples of hardware.
Head	A device that reads, records, or erases data on a storage medium, usually a moving medium, such as a magnetic tape or disk.
Hierarchy	A specified rank or order of items.
	Data hierarchy is the structuring of data into subsets within sets.
High Level	High Level Language is a method of programming that allows the use of letters, English-like text, symbols instead of the ones and zeroes the computer understands.
Highlight	computer makes certain characters or blocks of information stand out from the rest of the text by making it brighter in contrast to the rest of the screen.
Identifier	In information retrieval, a symbol whose purpose is to indicate or label a body of data.
	Diskette identification is very important for retrieval. Select a scheme or method to which it is easy to adhere and then later from which it is easy to retrieve.
	File identification such as a label or tag is used to identify or name a physical medium containing data, such as computer input or output data.
Image	A representation of information in one storage medium of information in another storage medium; wherein there is a one-to-one relationship between the characters.

	Core image refers to the image of the ones and zeroes represented by polarized magnetic cores, formed or stored in another medium. Such image would only be useful to a technical programmer or software vendor attempting to debug a procedure or program; personal computer users are not usually sophisticated enough to use such tools as these.
Index	A symbol used to identify a particular quantity in an array of similar quantities. Personal computer users may refer to index in its standard form to merely log programs, applications, etc. in a uniform way for later retrieval.
Information	The meaning assigned to data by known conventions, used in its representation.
Input	Data that is to be processed or operated upon; transfer of data into the computer. Manual input refers to the entry of data, the data itself, the channel or device used to enter data into a machine through the direct manipulation of a device by a human being. Input-Output is the medium or device used to inset information data, or instructions into a computing system or the medium or device used to transfer information or data usually processed from a computing system to the 'outside' world.
Inquiry	In the field of information storage and retrieval, a request for information from storage, or from an information network or system. Report retrieval by means of inquiry is often known as a query and many languages written for this purpose are known as query languages.
Installation	A computer installation is a facility or computation center, usually consisting of one or more general-purpose electronic digital computing machines, offline equipment, satellite computer, communications equipment and operating personnel. A terminal installation is a group of operable data terminal equipment and any related equipment.
Integer	A whole number, thus a number without a fractional part.
Integrated	type of circuit also known as a chip; a group of interrelated circuits in a single package.
Intelligence	Artificial intelligence is the capability of a device to perform functions that are normally associated with

	human intelligence, such as reasoning, learning, and self-improvement.
Interactive	describes a computer system where a two-way conversation goes on between the user and the computer.
Interface	A shared boundary; for example, the boundary between two systems or two devices; a piece of hardware or software used to connect two devices (computers and peripherals) that can't be directly hooked together.
Interpreter	A computer program that translates and executes each source language instruction before translating and executing the next one. A translator of non-machine language into machine language. A decoding device; more convenient but less efficient than compilers.
Interrupt	The stopping of a process in such a way that it can be resumed; such as a temporary suspension of a sequence of operations or the signal that causes the suspension.
I/O	I/O, IO, or I-O are abbreviations for input/output.
IPL	Acronym for Initial Program Load. Systems need to be loaded with the software which allows them to run; large mainframes have operations operators who IPL the system; personal computer users will simply 'load the program disk'.
Item	In data processing, a collection of related characters treated as a unit.
Iterate	To repeatedly execute a series of steps until a specified condition is satisfied.
Justify	to shift a data item in a storage medium so that a particular part of the item assumes a particular position relative to some reference point. For example, words are usually left-justified and numbers are usually right-justified and leading zeroes are either filled in or left blank - but with space left for them.
Key	A marked button or lever, manually operated for copying a character. In data processing, one or more characters used to identify a body of data such as data elements, data items, data codes, data chains, or a document. Key is used as a verb to indicate the action of inputting text or data through the use of a keyboard. In COBOL an actual key is the data item which may be used as a machine address and expresses the location of a record in a storage medium. A load key is a manual control key or similar device used to initiate the input of data or instructions into a machine, such as a computer or control system.

	A search key is data that is to be compared with specific parts of data items, labels, or identifiers for purposes of identification when conducting a search.
Keyboard	A set or panel consisting of an array of keys. Most keyboards are similar to that of a typewriter; many have special locations for just numbers (called number pads or islands) and many have rows of keys to perform special functions (called soft keys or program function keys) for containing actual programs or functions so that instructions don't have to be keyed or typed repeatedly.
Keypunch	A device, with a set of manually operated keys, arranged so that depression of a particular key will cause data to be transmitted to some medium (cards, tapes, disks) so as to represent information. Most data entry is done from terminals now, and keypunch is becoming an obsolete expression.
Label	In information processing, a key consisting of one or more symbols, used to identify a body of data. Labels on storage media such as tapes or disks/diskettes should follow some prescribed format so that they are meaningful and easy to retrieve at a later date.
Language	A set of representations, conventions, and associated rules used to convey information. Examples of languages include English, French, COBOL, Fortran, Assembly. Machine language is a set of instruction code used by the computer (consisting of arrangements of ones and zeroes). Programming language is used to prepare computer programs; it contains sets of rules and conventions that govern the manner and sequence in which instructions are written or specified for execution by the computer.
Layout	A file layout is the format of a file, including structure, sequence, size and nature of parts of the file. A record layout shows the arrangement of data items in a record. (Files are made up of records; records are made up of fields.)
Length	Field length refers to the number of columns or characters in a given field. Record length refers to the total number of digits, characters, words, or blocks contained within the fields which are contained within the record.
Letter	An alphabetic character used for the representation of sounds in a spoken language. Letter is also a form of

	correspondence from one entity to another with a heading, date, name, address, salutation, body, and closing.
Level	A given relative rank or position in a hierarchy of a given class of entities.
Library	An organized collection of documents used for reference or study. An organized collection of data associated with a program or group of programs.
Line	In data processing a horizontal row of characters printed across a page. In signal communications, a channel or conductor. A transmission line is a path for sending power or signals from point to point.
Link	A communication link is the physical equipment used to connect one location to another for the purpose of transmitting and receiving information.
List	To place data items in a column (verb) or the data items placed in a column (noun).
Load	In computer programming, to place data into a storage unit, such as by means of an input routine. After power is turned on, terminals begin generating instructions either by a load routine on a hard disk, or by inserting a diskette containing the system software.
Location	In data processing any place in which data may be stored. (Inside the computer, addresses are assigned to each location.)
Machine	In data processing, a computer, such as an electronic data processing machine or an individual component of an overall data processing system (such as a tape unit, card reader, or central processing unit).
Maintenance	File maintenance is the activity of keeping a file up to data by adding, changing, or deleting data. Preventive maintenance includes tests, measurements, replacements, repairs and similar activities carried out with the intention of preventing faults, failures, malfunctions from occurring during subsequent operation.
Malfunction	The unexpected effect of a fault or failure in the operation of the hardware of a system.
Management	Management Information System (MIS) is an organized method of providing past, present, and projected information related to internal operation and external intelligence, supporting the planning, control and operational functions of the organization.

Manipulate	To treat or operate upon either manually or electronically in a skillful manner to produce desired results.
Margin	A justified margin is an arrangement of data printed on a page in such a manner that the left or right end characters of each horizontal line or row lie in the same vertical left or right column (that is under one another). A ragged margin is an arrangement where a limit is set; but each horizontal line may end either at that limit or a few spaces before, depending upon the length of the word.
Match	To determine the extent of similarity or agreement between members of one set and members of another set in order to select or separate comparable members.
Medium	A material or method for storing or otherwise handling data. Plural form media is often used. Machine readable medium is one which can be used to convey data to a sensing device. Storage medium is the material or its configuration on which data is recorded.
Memory	The circuitry and devices that hold binary ones and zeroes which the computer can access; also called main or primary storage. Memory location is the same as address, and is an identification represented by a number or another set of symbols to indicate the address in storage where a program stopped or malfunctioned. Some memory typewriters record information and play it back. (See automatic typewriter).
Merge	To combine two or more sets of items into one, usually in a specified sequence.
Merge/Sort	To sort, that is to produce a single sequence of items ordered according to some rule from two or more previously unordered sequences.
Message	An amount of information whose beginning and end are defined or implied. Also a communication from the computer to the user in writing or signal form.
Method	The details and mechanics of accomplishing the individual steps toward a goal.
Microcomputer	these have larger memories than microprocessors and a complete built-in set of input and output instructions.

Microfiche	A photographic negative film in the form of a single sheet containing an array of frames, each frame being a photograph of a page, drawing, or similar item. One standard microfiche has a reduction ratio of one to twenty and measures four by six inches; holds about 270 computer printout pages. A sheet of microfilm. Microfilm is also used to photograph documents in reduced sizes for storage and subsequent viewing; usually on long strips instead of single sheets.
Microprocessor	Contains operational procedures and capabilities similar to a larger computer; but on one integrated circuit or chip instead of several IC's or several boards.
Microprogram	A computer program written in the most basic or elemental instructions or subcommands a computer is capable of executing.
Minicomputer	A small computer with the same capabilities as a larger one; but on a smaller scale.
Minimal	Pertaining to the least, smallest, shortest, or similar superlative.
Mistake	In data processing, a human action causing an unintended and usually undesirable result; for example, the failure of a human operator to carry out an operation in the required or proper manner (such as in writing a program or in operating equipment).
Mnemonic	Assisting, or intended to assist, human memory. Mnemonics make use of established conventions, prior training, and memory aids, such as the use of an abbreviated symbol that assists human memory.
Mode	A status; for example, a manner, method, or fashion, such as binary mode, interpretive mode, parallel mode, or the most frequent value in the statistical sense.
Modem	(Modulator-demodulator). The modulator and demodulator circuits of a carrier terminal are normally mounted together on a single panel and may have common elements.
Modifier	In computer programming, a word or quantity used to alter an instruction so as to cause the interpretation and execution of an instruction that is different from the original instruction. Modify is the verb describing the above action.
Modular	The property of a system that permits it to be constructed or assembled from sets of components or subassemblies. Several related pieces instead of one complex whole.

	Modulation is the process of varying some characteristic of a wave in accordance with another wave. Modulator is the device that receives two signals and causes a characteristic of one of the signals to vary in accordance with a characteristic of the other. Module is the interchangeable unit that contains component parts or subunits. A programming module is a set of computer program instructions treated as a unit by an assembler, compiler, translator, loader or other routine or subroutine.
Multiprocessing	pertains to either the simultaneous or the interleaved execution of both, of two or more programs or sequences of instructions by a computer component, a computer, or a computer network. Multiprocessor is a computer having multiple arithmetic or logic units that can be used simultaneously.
Mundane	A word similar to minute in that it can mean the smallest, or most obscure task; but usually also means a tedious or boring task.
Name	One or more words used to identify a single member or other subset of a class of persons, places, things or concepts. A data name is an identifier, label or tag for an item of data.
Network	An interconnected set of points or objects, such as electrical circuit elements, power stations, communications equipment or terminals. A computer network is made up of two or more interconnected computers.
Notation	A systematic or conventional method for representing information through the use of signs and symbols.
Null	Pertaining to a negligible value or lack of information in contrast to a zero or a blank that conveys information, such as in numerals and spaces between words. Screens are usually said to be made up of nulls until keying begins.
Number	A mathematical entity or abstraction to indicate quantity or amount of units, such as a number of feet or the number of miles per hour. Loosely, a numeral. A binary number is a numeral written in the binary numeration system; a zero or one. See 'binary' and

	'digit'.
	A decimal number is a numeral written in the positional notation system of radix 10 (zero thru 9; hexadecimal includes zero thru nine, then places an alpha figure in the rightmost column).
	A random number is one whose successive digits are determined by a process under which each digit is equally likely to be any one of a set of permissible digits chosen.
	A real number is a member of the set of all positive and negative numbers, including integers, zero mixed, whole, rational, and irrational numbers, but excluding any imaginary or complex numbers.
	A serial number is a numeral assigned to an item as a label, usually to denote the time sequence or spatial position of the item relative to other items.
Numeral	The design or symbol, or set of designs or symbols used for the representation of a number. Loosely, a number.
OCR	Optical Character Recognition is the identification or printed characters through the use of light-sensitive materials or devices; then converts them to a digital signal for input into a data or word processor. Also, the machine or device which performs the conversion is called an OCR reader.
Offline	With reference to given equipment, pertaining to other equipment not in direct communication with or under the direct control of the reference equipment. For example, an offline printer is one which is not connected to the terminal from which the command to print is given; instead, the command goes to another processing unit, then to the printer.
Online	With reference to given equipment, pertaining to other equipment in direct communication with or under the direct control of the reference equipment. For example, printing can be instantly accomplished from the terminal when the printer is online.
Operating	See 'System' for the definition of operating system, which is the actual 'brain' of the computer.
Operation	A defined action, namely the act of obtaining a result from one or more operands in accordance with a rule that completely specifies the result for any permissible combination of operands; the set of acts specified by a rule or the rule itself; the act specified by a computer instruction; a program step undertaken or executed by a computer.

	Asynchronous operation is a sequence of operations such that each operation is initiated upon completion of the previous operation.
	Auxiliary operation in a computing system, is an operation performed by equipment that is not under direct control of the CPU or control unit.
	Computer operation is the electronic, mechanical, or other physical action of the hardware of the computer; usually resulting from the execution of instructions designed to obtain computed results.
	Control Operator operation is an action performed by a device; for example the starting or stopping of a device or process. The person who actually manipulates the computer control, places data media into the input devices, removes output, mounts reels of tape, pushes buttons, and performs other similar duties.
Optimization	A method of arriving at the most desirable set of conditions based on a set of criteria or constraints.
Order	To put items in a given sequence, usually by sorting and then sequencing.
Output	Data that has been processed. Also the process of transferring data from internal storage to external storage of a computer or to its peripheral or online equipment or to a human being.
	Direct output is data obtained from online output equipment or the online output equipment itself.
Page	One side of a single piece of paper containing data.
Paragraph	A group of sentences logically related. A logical group of code in COBOL.
Parallel	Pertaining to the simultaneous occurrence of two or more processes or events.
Parameter	A variable that is assigned a constant value for a specific purpose or process.
Pass	In automatic data processing to process such as scan, search, or examine the data contained in a given file for a specific purpose.
Perforated	Punched with holes. Continuous feed sheets and forms are perforated between sheets as well as on both margins for tearing off the sides where the holes are located for tractor or pin feed mechanisms.
Peripherals	Equipment (usually hardware) that is external to the computer itself. The most common peripherals used with

	popular computers are disk drives, printers, and additional storage (memory) devices.
PL-1 or PL/1	Programming Language - one: a programming language developed by IBM which looks and behaves like an extension of Fortran, and is also well suited for data handling.
Platen	A smooth, tough surface, often cylindrical, against which printing mechanisms strike to produce an impression.
Plot	To draw a map, graph, diagram, or other line drawing type of display.
Plotter	A device capable of presenting data in graphic form, such as two-dimensional curves or line drawings.
Port	A place where a peripheral device can be plugged into a computer.
Post	To record a unit of data.
Printer	A device that forms a visible permanent image on a surface by the application of ink. Bar printers have type at each print position held in a long narrow box or magazine from which the type projects; chain printers are high speed printers in which the type is carried on a moving closed loop chain or belt that is hit by an appropriate hammer as the type moves across the paper. Impact printers produce hard copy by physically striking a ribbon on paper. Ink jet printers form characters by actually spraying a 'jet' of ink onto the paper to form the requested character; this is done at high speeds. Line printers compose and determine the line of print within the printer before the entire line is actually printed. Many line printers print back and forth (as the carriage moves to the right and to the left). Matrix printers form characters by forcing a set of selected stylus' or wires against the ribbon or paper (usually in patterns of dots - the more dense the pattern, the clearer the characters). Page printers compose the entire page before printing begins, then prints the entire page during a single cycle. Wheel printers have the type face mounted or engraved on the outside rim of a disk or wheel; there is a wheel for

	each print character position in a line of print. However, daisy wheel printers have a single character on each 'petal' and a single hammer wheel rotates to print the desired character in the desired print position (thus, the daisy wheel is a 'character' printer).
Process	In data processing, to handle, manipulate, or perform some operation or sequence of operations on data in accordance with a specified or implied algorithm, including operations such as compute, assemble, compile, interpret, generate, store, search, sort, merge, read, write, print, etc. Information processing is the entire field of computers, data processing, process control, and numerical control. Parallel processing pertains to the simultaneous execution of two or more sequences of instructions by a device having multiple processing units. The processor in computer hardware is the data processing system; for example a computer. Data processor is the equipment that is able to perform operations on data with its programs. Data processors include accounting machines, tabulators, and may exist as either hardware or software.
Program	The plan or specification of steps for solving a problem, including an analysis of the problem, to arrive at the steps, the steps themselves and any associated actions, such as diagramming, development of computer routines or subroutines, allocation of storage, specification of input and output formats, and any other action required to set up for a computer run, including coding or the plan for solving a problem. A computer program is the series of commands, instructions, or statements put together to do a specific thing or series of things. A general computer program is designed to solve a class of problems, becoming applicable to a specific problem only when appropriate parameters or values are applied. This is also known as a 'generic' program. A maintenance program consists of diagnostics, test routines, and similar routines designed to assist in removing or reducing malfunctions in a computer. A source program is one written in a source language; that is in a language designed for convenience of expression, in a class of problems, by a human. A specific computer program is one that can only be used to solve a particular problem and is not applicable to any other problem.

	A standard computer program meets certain specified criteria; for example, a program written in a standard common programming language (such as Fortran or COBOL).
	A stored computer program is one that has been placed in storage and is accessible to the computer automatically.
	A utility program is a general-purpose program, supplied by a manufacturer with his equipment for executing standard or typical operations such as sorting, translating, assembling, compiling, merging, or copying.
Programmer	A person who prepares and plans the sequences of events that a computer must undertake in order to solve a problem.
Programming	The field of interest devoted to the art and science of planning the solution of problems by reducing the plan to a set of machine-sensible instructions that can direct the actions of a computing or data processing system, capable of performing logic operations that will yield solutions to the problems.
Proportional	Proportional spacing occurs when different characters take up different amounts of horizontal spacing (for example, 'i' takes less space than 'm').
Quantity	An entity or an amount of something that is measurable, the measure or size usually being expressible in terms of numbers.
Query	Query language is a set of commands (English-like usually) employed by a user only to extract data already on the computer.
Queuing	Pertaining to the movement in time and space of discrete units through channels; for example, the movement of people through a line, aircraft arriving at a terminal and waiting for runway availability, and data arriving at a computer and awaiting execution of programs.
Radix	Although we won't usually need this term, it has been used to define the binary and decimal numbering systems. In a positional numeration system, the radix is a quantity whose successive integral powers are implicit multipliers of the sequence of integers that represent a number. See also binary digit.
RAM	Random Access Memory, the main type of memory used in small computers; also known as read/write memory because data in RAM can easily be changed. Any data stored here would be lost when the power goes off; must be loaded each time the system is turned on.
Range	The set or span of values that a quantity or function may have or may assume. The difference between the

	highest and lowest values that a quantity or function may assume.
Rank	Relative position in an ordered sequence with the higher order position considered to be of higher rank.
Read	To sense or obtain data from a record, medium data carrier, document, storage, or other form. Getting the information from a file and transferring it to memory or another device.
Read-In	To sense, read, or transcribe data into a device from an external medium.
Readable	Machine readable pertains to the characteristic of being able to be sensed or read by a device, usually by a device that has been designed and built specifically to perform the reading or sensing function.
Record	A collection of related data elements, items, or codes, treated as a unit.
Redundant	Equipment facilities or data over and above the minimum required for a specific purpose or effect.
Register	A device capable of storing a specific amount of data, such as a character, word, or numeral in a digital computer, temporarily; such storage in the CPU is lost when power is turned off. An address register in a computer is one that holds the address part of an instruction word while the instruction is interpreted for execution. This address is then referenced in diagnostics and debugging messages. An arithmetic register is one in the logic unit of a computer than holds the operands that to be operated upon. An index register is one whose contents are used to modify an instruction prior to its execution. A storage register is one in the storage unit of a computer that is involved in all transfers of data to and from the storage unit and all other units of the computer, such as the arithmetic unit, the control unit, and the input-output units.
Reliability	The probability that a device will function without failure over a specified period of time or amount of usage.
Relocate	To move a routine from one storage location to another, making appropriate adjustments in addresses so that the routine can be executed from the new location.

Reproduce	In data processing, to prepare a duplicate of stored data.
Rerun	To repeat all or part of a routine on a computer. Reruns become necessary because of interruptions, false starts, the need for corrections of variables, or similar reasons.
Reset	This command instructs the computer to restart. It essentially turns the computer off, then on again.
Retrieval	Data retrieval is the searching, selecting, and making available the actual data contained in a file. Document retrieval is the indexing, searching, and identification of specific documents that contain desired data concerning a stated matter of interest. Information retrieval is the recovery and interpretation of stored data, including the procedures, techniques and related activities involved, such as the selection of and utilization of storage devices.
Return	A carriage return is the motion of the carriage of a printer, typewriter, or similar device, back to the starting point or to some intermediate point. Microcomputers and word processors have a return key, and many manuals use 'CR' in the instructions when the desire is to end one line and begin another. Two carriage returns usually indicate the end of a paragraph.
ROM	Read-Only-Memory; where information is permanently stored and can't be altered (this access is also random).
Round-Off	To delete the lease significant digit of a numeral, and adjust the remaining part in accordance with some rule (such as rounding up, truncating, rounding down).
Routine	A set of instructions arranged in proper sequence that will cause a computer to perform a desired task, such as to solve a problem.
RS232C	A technical specification published by the Electronic Industries Association which specifies a way in which a computer communicates with a peripheral (such as a modem or terminal).
Run	In computers and data processing a single continuous execution of a computer routine, usually with regard to the solution of a single problem. As a verb, run is the command which causes such execution. Running parallel is operating a newly developed system that is to replace an old system at the same time the

	old system is still in operation. This allows comparison of results so that if the automated or new method does not produce the desired results of the old method, modifications can be made to the new method before the old method is discontinued.
Scan	To examine, part by part. To search rapidly. An optical scanner is a device that examines or senses a pattern and generates an analog or digital representation of the pattern, usually by optical means. Also known as an optical character reader.
Screen	The inside or outside face of a cathode ray or video tube. As a verb, to make a preliminary selection of a set of items from a larger set according to a given criteria, usually in order to reduce the number or items to be more thoroughly searched at a later time.
Search	To examine a set of items for a subset that has a specific property or specified criteria.
Sectors	Sectors and tracks are portions of a disk for storing the bits and bytes. When data is stored on diskette, the surface is divided into a number of circular tracks (like a phonograph record), which are called tracks. Each track is further divided into sectors. When accessing a particular file, the computer actually goes to a given sector on a particular track.
Seek	Same as search, but usually associated with magnetic disk file searching.
Select	To take alternative 'A' if one condition is met, or to take alternative 'B' if the other condition is met. In data retrieval statements, select can be used with certain variables (even without alternatives being stated).
Sense	To determine the state or condition of an item.
Sequence	Same as order; an arrangement of items in accordance with some criterion that defines their spacewise or timewise succession.
Sequential	Pertaining to the occurrence of two or more events in time sequence with only accidental or no overlap of events.
Serial	The time-sequencing of two or more processes or events, similar or identical processes, or individual parts of a whole (such as bits of a word).
Service	A service contract is a repair contract (such as for computers or typewriters); in data processing, known as computer failure insurance.

Set	A character set is a set of characters that are mutually distinct and designed for a specific purpose.
Sign	An indicator that designates whether a number is negative or positive.
Signal	That which is transmitted in order to convey data.
Simulate	To represent the behavior of one system by another system. Simulator is the device or program that represents the behavior of another device or program.
Simultaneous	Pertaining to the occurrence of two or more events at the same instant.
Software	Data and information that are associated with the hardware of a machine or system; for example, the collection of computer programs, routines, compilers, assemblers, translators, manuals, circuit diagrams and operational procedures for a given system or hardware configuration. A software house is a company that writes programs or customizes programs specifically to the needs of an individual customer.
Solid State	Electrical components that convey or control electrons within solid materials; such circuitry has replaced the use of tubes and wired boards for computers.
Sort	In data processing to arrange data items in groups according to the specific rules, fields or keys used to identify and group them.
Sorter	A person, device, or routine that arranges items in groups according to specific rules.
Source	The original data document or original program; when a copy of the source is made, it is called a backup.
Space	A place intended for storage of data. To move or step from one place to another according to a prescribed format; one or more blanks.
Standard	An accepted criterion, established agreement, rule or test by which an action or item is judged with regard to characteristics such as performance, practice, design, terminology, size, shape, or weight. To standardize is to reduce or eliminate an unnecessary variety of things by establishing a policy and/or procedure to be followed.
Status	In order to receive or transmit data through a peripheral device, the computer checks its status; then

lets the user know if the equipment is ready or not. An example of a status message could be 'the printer is not ready', or "drive 'A' is empty".

Storage A device which receives data, holds it, and releases it at a later time. Also the activity of placing data in such a device.

To allocate storage is to assign specific storage areas for specific purposes, such as holding routines, input and output data, or constants.

Auxiliary storage is that which supplements another storage. Usually with lower speed, higher capacity, and longer access time than main computer storage.

Storage buffer is a device used to compensate for differences in the rate of flow of data or time of occurrence of events when transmitting data from one device to another.

Core storage consists of an array of magnetic cores, each capable of storing one binary digit; they may be arranged in matrices, arrays, stacks, bubbles, etc.

External storage is that which is not permanently linked to the computer, but its contents are acceptable by the computer when such link is made (through instructions of a program which accesses the external storage device through the intervention of a computer operator).

Internal storage is directly accessible by the computer's arithmetic and logic unit, is addressable by instructions, and controlled by the computer's control unit.

Magnetic storage is a device which uses the magnetic properties of materials to store information. Magnetic tape is a ribbon usually consisting of a base metal, plastic (such as Mylar), or acetate, and coated with a magnetic material.

Main storage is considered integral to or primary to the computing system. Mass storage is a relatively large volume of online storage directly accessible by the computer.

Offline storage is not under the control of the computer; online is directly under control of the computer.

Random Access storage occurs when the time for placing data into or obtaining data from it is independent of the location of the data most recently obtained or placed.

	Serial storage occurs when the data which is input, held, output is handled in a time sequence, one part at a time, dependent upon its location in the device. Temporary storage is used for partial or intermediate results.
Store	To enter data into a device. To retain data in a device; the same as the verb storage.
Stroke	The depression of a key on a keyboard. May be used to express rates such as data entry strokes per minute, hour, etc.
Study	An application study is the analysis of all available systems in order to obtain the most economical system to meet the stated requirements. A feasibility study is a preliminary study to examine the soundness of applying data processing systems to a given application or set of applications. The study involves a cost/benefit format for economical justification.
Symbol	A representation of something, usually by reason or relationship, convention or form. Most symbols in data processing assume the form of characters to represent data and information.
Synchronous	A mode of operation such that the execution of each instruction or each event is stepwise controlled by a clock signal.
Syntax	The structure of expressions in a language or the rules governing such structure.
System	An organized collection of resources such as people, machines, procedures, information and data structured in such a manner to operate together for a specific purpose or to reach a designated objective(s). If no machines are involved the system is called 'manual'; if machines are involved the system may be called 'automated'; and if computers are involved the system may be called 'computerized'. Systems analysts - see 'analysis'. System software includes the general purpose programs that allow programmers to write or modify application programs. BASIC may be considered part of the system software; so is the computer's operating system. Information system is the entire collection of procedures, operations and functions devoted to the generation, collection, evaluation, storage, retrieval and

	dissemination of data and information within the organization or area in order to promote the flow of information from source to user.
	Management Information System is an information system designed and operated to assist in the decisionmaking at any management level or set of levels desired.
	Operating system in computer programming is all of the software such as executive/loading routines, priorities and associated data to permit total system operation. This includes the arrangements for assignment of available hardware, storage, central processing unit allocation, control of queuing, input/output operations, and the general control of data flow.
Tab	A marker or label, positioned to permit quick identification. Also a keystroke which moves a cursor or print position to a desired location on a print line.
Table	A collection of data usually arranged in an array where each item in the array is identifiable by some label for its relative position.
Tabulate	To form data into an array.
Tape	In computers and data processing, a linear storage medium.
	Magnetic tape has a surface of magnetic material, such as iron oxide, on which data may be stored by selective polarization of portions of the surface.
Telecommunications	is the science of communication by electric, electronic, or electromagnetic means over long distances such as telegraph, radio, telephone, and television.
Terminal	In communications, a point at which data can enter or leave a communication network. A piece of equipment with a keyboard for input and an output device (such as a cathode ray tube or video display) or printer. A terminal is used to communicate with the computer.
	A data terminal is a device that modulates, encodes, demodulates or decodes data between input/output devices and a data transmission link, line, or network.
Test	A diagnostic test is designed to detect and locate malfunctions in a system. A compatibility test is run on a given set of equipment (hardware) and programs (software) to determine how well the components function as a system. A program test of the computer and its programs is done in order to discover errors either in the program or malfunctions in the computer by comparing the results with known results. A system test is the

	actual running of all types of applications on the complete system with known data, for purposes of testing the accuracy, capability, and adequacy of the entire system.
Text	In communications, the part of the message that contains the information to be conveyed. In data processing, text usually means words and bodies of information rather than programs and lines of program instructions, or the records of data to be acted upon.
Throughput	The total productive work of a system, all the way from preparing input data and programs through to utilization of output data.
Time	Access time is the interval between the instant at which data is called for from a storage device and the instant at which delivery is completed. Available time is the time that a device may be used or is used. Down time is the time during which a device is not functioning correctly due to a fault or failure. Execution time is the portion of the execution cycle during which actual work is performed due to a computer instruction(s). Idle time is when the equipment is available for use but is not being used. Installation time is the time required to place a system into operation (after delivery or arrival at the site).
Timesharing	A process whereby the facilities of a single (usually large) computer are shared by a number of users with terminals. Usually requires large amounts of memory and special software to make it appear that each user has the whole computer to himself.
Transcribe	To copy data from one storage medium to another.
Transform	In data processing to change the form of data in accordance with some pre-established rule.
Transistor	An active device, fabricated of semiconducting material appropriately doped as negative or positive with at least three electrodes; the device is capable of amplifying electric signal voltage, current, and many other functions.
Translate	To convert data from one language to another without affecting the meaning.
Translator	A routine, program, or device that is able to translate or transform statements or their equivalent codes in one language to equivalent statements in another language.
Transmission	The movement of data from one location to another or the data that is moved.

Transmit	To move data from one location to another.
Truncate	To omit, cut off, terminate at a particular place (for example to truncate a decimal such as 10.15 at the decimal so it becomes 10).
Tube	A cathode ray tube or CRT is a vacuum tube with a screen and a controlled beam of electrons, that may be used as a display or storage device (or both). Such a tube may also be known as a VDT or video display terminal, screen, terminal, display station, etc.
Turnaround	A Turnaround Document (TAD) is a form or document with some existing information - to which is added more data - then the resulting document is sent back to the source to be retained or entered into computer files to become the source document for the next cycle.
Turnkey	A type of system with the computer, hardware and software already installed. Theoretically, the user simply has to turn the system on.
Total	Batch totals of a certain number or group of quantities or unit records are used to verify the completeness and accuracy of operations on the group. Hash totals are obtained by adding all the digits in a numeral or group of numerals without regard to meaning or significance; they are used to ensure that all numerals have been properly handled.
Unit	A basic element, part, or device having a special function. The arithmetic unit of a computer or computing system contains the circuits that perform the arithmetic, logic, shift, and similar operations. The central processing unit (CPU) is the part of the computing system which controls the interpretation and execution of instructions. The control unit in a digital computer contains the circuits that effect selection and retrieval of instructions from storage or from outside the computer in their proper sequence. The display unit is the device or equipment whose output is a graphic pictorial or other visual image.
Update	To process a file in accordance with a specified procedure for inserting, deleting, or altering the data items in a file.
User	The person who uses the computer's information output.

User-friendly	A rather new term used frequently in reference to word processor and microcomputer software packages; it means that the instructions and commands are in English with everyday phrases. The mystique of machine language and programming languages is handled by the computer itself so that the user can just follow the instruction manual or a tutorial package without taking programming courses in most instances.
Utilities	Programs used by the computer for more than one purpose by many kinds of users; as opposed to application programs that perform only one task. Examples of utilities are backup, erase, duplicate, restore.
Validity	The degree to which an event (especially operations) are allowable, and a measure of the extent to which a standard has been met.
Variable	The representation of a quantity, or the quantity itself, which can assume any of a given set of values.
Vocabulary	An ordered word list with a definition of each word entry in the list.
Word	In computers and information processing, a group of characters treated as a unit and to which meaning can be assigned. A computer word is a sequence or group of characters (such as bits) treated as a unit and capable of being stored in one computer storage location. Word processing is the transformation of ideas and information into a readable form of communication through the management of procedures, equipment, and personnel; usually including the entry, manipulation, editing, storage and printing of text using a computer. Word processor is the equipment with software and programs written specifically to meet the needs of an office.
Write	This command actually puts the information onto a diskette or other media. Write-protect does not allow the user to write on or change data contained on a storage medium; this is for security to avoid loss of critical data by overlaying it, or theft of programs by copying them. Diskettes have write-protect notches to prevent writing when they are not covered; however, they can be covered to allow data to be added, changed, or deleted.
Zero	A binary zero is one of the two possible binary digits. The possibilities are one and zero; zero has the value of zero and is usually written as '0'.

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CREDITS

Some cartoons adapted from those of Daniel Le Noury (DON'T!) above. Some technical illustrations adapted from those of Jeanne E. Tennant, also from (DON'T!) listed above. This primer prepared using a CPT Model 8525 word processing terminal, and a CPT Rotary VIII printer.

BROCHURES

CPT Corporation (8500 Series, Software, Printers, Workless Station).
Teletype Corporation (5540: 3270-Compatible Information Display System).